MOTOROLA INC., COMMUNICATIONS DIVISION • **INSTRUCTION MANUAL**

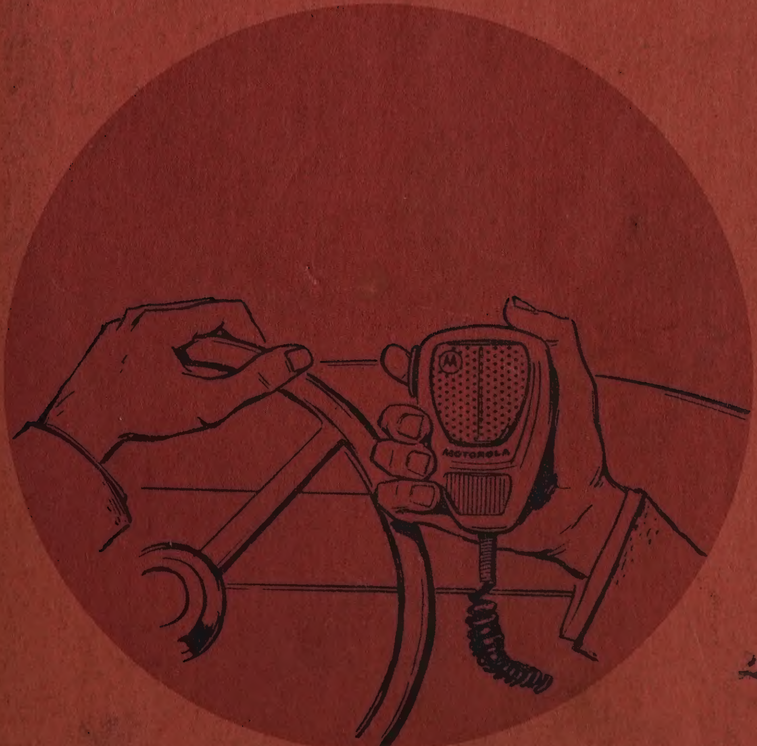
MOTOROLA

Mobile and AC Utility

FM Two-Way Radio

144-174 MC 10/25 W RF POWER 6/12 VDC 117 VAC

Twin-V
RADIOPHONE
6 12



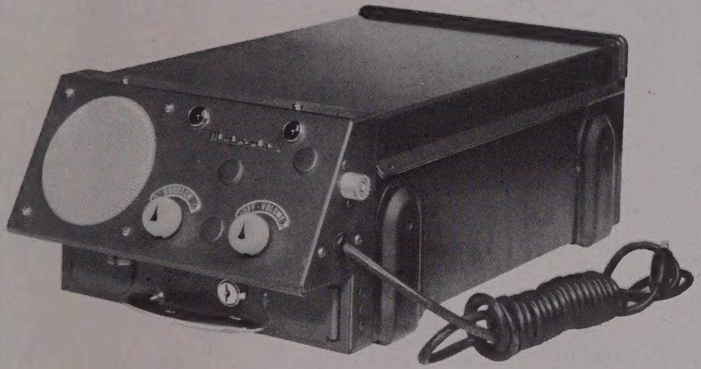
PRINTED IN U.S.A.

MOTOROLA

MOBILE & AC UTILITY

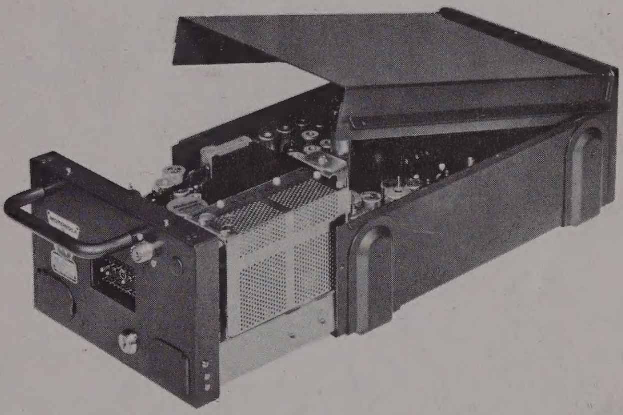
FM TWO-WAY RADIO

10 & 25 W RF POWER
144-174 MC
6/12 VDC   117 VAC



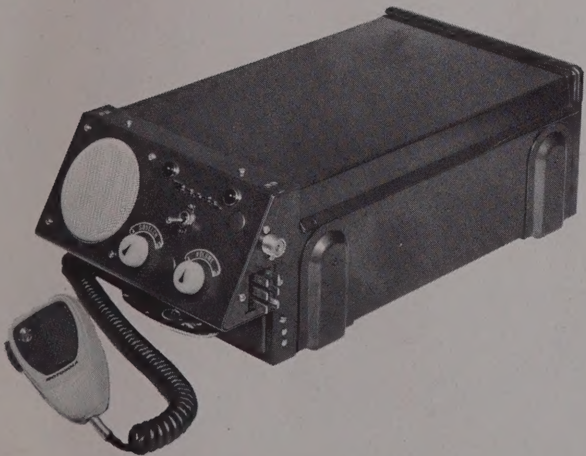
25 WATT
A-C UTILITY

MC 773



10 & 25 WATT
TRUNK MOUNT MOBILE

MC1794



10 & 25 WATT
FRONT MOUNT MOBILE

EPD-2008 (MC1788)

MOTOROLA INC.
COMMUNICATIONS DIVISION
Engineering Publications   *4501 W. Augusta Blvd.*   *Chicago 51, Illinois*

Printed in U. S. A.
1/15/60-CP

68P862490
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SECTION INDEX

DESCRIPTION
INSTALLATION & OPERATION
RECEIVER
TRANSMITTER
POWER SUPPLY
MAINTENANCE
NOISE SUPPRESSION

GUARANTEED PERFORMANCE SPECIFICATIONS

MODEL	T43GGV Series D43GGV Series	T33GGV Series D33GGV Series	D43GGB Series
FREQUENCY	144-174 mc		
R-F POWER OUTPUT	25 watts	10 watts	25 watts
TRANSMITTER MODULATION	40F3: ±15 kc for 100% at 1000 cycles 20F3: ±5 kc for 100% at 1000 cycles		
SELECTIVITY	-100 db at ±18 kc	-100 db at ±32 kc	-100 db at ±120 kc
MODULATION ACCEPTANCE	±5 kc at -6 db	±15 kc at -6 db	±15 kc at -6 db
20 DB QUIETING SENSITIVITY	Less than 0.6 microvolt; 50 ohms r-f input impedance		
METERING	Chassis mounted metering sockets on the transmitter and receiver facilitate convenient metering of all circuits essential to tuning and checking. A Motorola portable test set or a 0-50 microampere meter may be used for this purpose.		
POWER INPUT	Standby: 11.0 amps at 6.3 v d-c or 6.0 amps at 12.6 v d-c		Standby: 70 watts at 117 v a-c
	Transmit: 28.0 amps at 6.3 v d-c or 15.0 amps at 12.6 v d-c		Transmit: 175 watts at 117 v a-c
	Intermittent Drain; each crystal heater: 1.0 amp		
DIMENSIONS	6" high x 9-7/8" wide x 18-1/4" long overall		

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FCC LICENSE DESIGNATION:

CC3019 for 10 watts output
CC3012 for 25 watts output

FOREWORD

PURPOSE OF THE MANUAL

This manual offers the serviceman complete installation, operation, maintenance and service information on the Motorola 2-way radio models described in it.

The manual will serve as a ready reference for the experienced technician and also as a step-by-step guide for the inexperienced man.

For convenience and quick reference, the manual is divided into separate sections. Each section has complete alignment, service and maintenance information on its chassis and/or kits and includes its own diagrams, details and parts lists. For example, the Receiver section contains complete information on the receiver models described in it. Installation and operation of the complete radio set are covered in a separate section. All major section paragraph headings and diagrams are listed for the serviceman's use in the Table of Contents.

THE "RADIO SET"

Motorola 2-way radio equipment is packaged as a radio set plus accessories. The radio set is assigned a model number for identification purposes. It includes the transmitter, receiver, and power supply chassis in a single housing. This model number describes the package specifically. Use the model number in its entirety when making inquiries about the equipment.

Example: T43GGV-1001A - describes a trunk mount, 144-174 mc, 60 kc channel spaced set with a 25 watt, one frequency transmitter, and a vibrator power supply.

It is evident that the model number is easier to use and is more specific than a word description.

The accessories are identified by an accessory group number which includes those other items essential to completing the radio installation such as; antenna, speaker, cables, etc. Use this number when referring to a specific group of accessories.

Example: EA1000A - describes an accessory group which includes a one-frequency control head with microphone, 6 v d-c cable kit, installation kit, roof top antenna, and a speaker

In addition to these model and group numbers, Motorola has assigned identifiers to all chassis and kits. These are for inventory and stock control purposes and should be used by the serviceman when requesting information on them or when ordering replacements. Use the assigned number identifiers. It will be to your benefit. These are the only sure means of describing the radio equipment and its many parts.

The radio set model number is metal stamped on the equipment nameplate along with the transmitter type number, serial number and type of primary power. Chassis and kit numbers are rubber stamped on the chassis or kit itself.

For the serviceman's use, breakdown cross reference charts on radio set models and accessory groups are located in the front matter section of the manual.

PRODUCTION CHANGES

When production and engineering changes are incorporated into the equipment, a revision numeral is assigned to the chassis or kit affected, e.g.; TRD1150AB becomes TRD1150AB-1, with the first revision. This chassis number complete with revision numeral is stamped on the chassis at the time of production, and the revision numeral becomes an integral part of the chassis identifier.

A schematic diagram number complete with its issue letter is also stamped on each chassis. This establishes direct correlation between the chassis and its schematic. The schematic issue is advanced each time a change occurs in the chassis. The most recent issue is stamped on the chassis.

INSTRUCTION MANUAL REVISION BULLETINS

Those changes which occur after an instruction manual is printed are covered by the Instruction Manual Revision Bulletins. These bulletins give the reader complete information on the change including pertinent parts listing data from which the instruction manual can be corrected.

NATIONAL SERVICE ORGANIZATION

Motorola is a nation-wide service organization. Through its maintenance and installation program Motorola makes available the finest service to those desiring reliable continuous communications on a contract basis.

The largest service organization specializing in mobile communications is Motorola's National Service Organization. Over 800 strategically located, adequately staffed and trained, independently owned and operated stations, manned with several thousand FCC Licensed Personnel constitute the sub-contracting force.

The administrative forces of area and district service managers and district service representatives are in the direct employ of Motorola.

For your contract service requirements, please contact your local Motorola representative or write to:

National Service Manager
Motorola Communications Division
4501 W. Augusta Blvd.
Chicago 51, Illinois

REPLACEMENT PARTS ORDERING

Motorola maintains parts and service depots in Dallas, Texas, and Burlingame, California, to supplement the activities of the Parts and Service Department in Chicago. The table outlines the services provided by these facilities:

Factory: **Crystal Service Department,**
916 N. Kilbourn Ave.,
Chicago 51, Illinois

Chicago Parts and Service Department:
4910 West Flournoy Street
Chicago 44, Illinois

Dallas Parts Depot:
7138 Envoy Court,
Dallas 35, Texas

Burlingame Parts Depot:
1616 Rollins Road,
Burlingame, California

Area Served	Parts & Service	Crystals	Resonant Reeds
Central and Eastern area	Chicago Parts Dept	Factory	Factory
Southern area	Dallas	Factory	Dallas
Western area	Burlingame	Factory	Burlingame

These offices are fully equipped to give this service. When ordering replacement parts, the complete number identification of the item must be used whether it be a component, kit or complete chassis. This will fix proper identification and insure receipt of the desired item. Complete number identification should also be used when requesting equipment information.

Crystal orders should specify crystal type number, crystal frequency, carrier frequency and the chassis model number in which the crystal is to be used.

Orders for "vibrasender" and "vibrasponder" resonant reeds should specify the type number and frequency and should identify the owner and operator of the "private-line" network in which these items are to be used.

CAREFUL USE OF THE INSTRUCTION MANUAL AND THE MANY SUGGESTIONS CONTAINED IN IT WILL FURTHER INSURE PROPERLY INSTALLED AND MAINTAINED RADIO EQUIPMENT.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U. S. PATENTS:

RE-24,110
D,159,182
2,343,115
2,404,359
2,439,408
2,439,412
2,459,675
2,472,021
2,524,300
2,524,534
2,547,023
2,547,025
2,547,027
2,566,759
2,583,032
2,602,842
2,608,648
2,608,649
2,626,384
2,636,652
2,637,782
2,650,333
2,652,542
2,662,942
2,688,059
2,691,094
2,691,560
2,699,425
2,705,281
2,713,664
2,731,555
2,738,466
2,740,891
2,743,144
2,743,361
2,750,451
2,759,052
2,759,103
2,770,721
2,777,950
2,784,263
2,799,001
2,799,010
2,799,832
2,808,507
2,809,236
2,810,068
2,811,590
2,830,200
2,833,994
2,834,879
2,835,794
2,846,596
2,852,730
2,860,239
2,864,943
2,883,521
2,888,652
2,899,547
2,901,601
2,905,909

Other U.S. Patents Pending

CONTENTS

SECTION NUMBER

Guaranteed Performance Specifications . . . Page ii
Radio Set Model Chart . . . EPD-2867
Accessory Group Chart . . . EPD-1895

DESCRIPTION . . . 68P856721
  Introduction . . . Page 1
  Description of Radio Set Items . . . Page 2
  Description of Standard Accessories . . . Page 2
  Optional Accessories . . . Page 3

INSTALLATION AND OPERATION . . . 68P856722

Installation

  Mobile Radio Sets . . . Page 1
  A-C Utility Radio Sets . . . Page 1

Operation

  Mobile Radio Sets . . . Page 1
  A-C Utility Radio Sets . . . Page 1
  Operator's Instructions . . . Page 3

Diagrams

  Front Mount Radio Sets with D-C Volume Control and Wired-In Microphone and Parts List . . . 63E835263
  Front Mount Radio Sets with Provisions for "Quik-Call" and Parts List . . . 63E836073
  Front Mount Radio Sets with D-C Volume Control and Parts List . . . 63E862103
  Rear Mount Radio Sets and Parts List . . . 63E839323
  A-C Utility Radio Sets with D-C Volume Control and Parts List . . . 63E835264
  A-C Utility Radio Sets with Provisions for "Quik-Call" and Parts List . . . 63E836072
  Front Mount Radio Sets Simplified Functional Diagram . . . 63E854644
  Rear Mount Radio Sets Simplified Functional Diagram . . . 63E854643
  A-C Utility Radio Sets, Simplified Functional Diagram . . . 63D854646

RECEIVER . . . 68P862492
  Description . . . Page 1
  Guaranteed Performance Specifications . . . Page 2
  Operation . . . Page 3
  Alignment Procedure . . . Page 5
  Pre-operation Notes . . . Page 5
  Receiver Alignment Procedure Chart . . . EPD-2005
  Schematic Diagram (1-Frequency), Parts Location Detail and Parts List . . . 63E862494
  Schematic Diagram (2-Frequency), Parts Location Detail and Parts List . . . 63E862493

TRANSMITTER . . . 68P856732
  Description . . . Page 1
  Guaranteed Performance Specifications . . . Page 2
  Control Crystal Requirements . . . Page 3
  Circuit Operation . . . Page 3
  Adjustment of the IDC Control . . . Page 4
  Alignment Procedure . . . Page 5

SECTION	NUMBER
Alignment Procedure Chart	EPD-1698
TTD1000 Series Schematic Diagram, Parts Location Detail and Parts List	63E856736
POWER SUPPLY, 25 WATT	68P845593
Nominal Performance Specifications	Page 2
Description	Page 3
Schematic Diagram and Parts List, Model TU117	63E831716
Schematic Diagram and Parts List, Model TU117-F.	63E835298
Schematic Diagram and Parts List, Model TU189	63D835279
POWER SUPPLY, 10 WATT	68P836083
Description	Page 1
Nominal Performance Specifications	Page 2
Schematic Diagram and Parts List, Model TU212	63D836037
Schematic Diagram and Parts List, Model TU212-F.	63D836038
ROUTINE MAINTENANCE	68P849707
Introduction	Page 1
Maintenance Checks	Page 3
10" Mobile Housing Parts Identification Detail.	EPD-901
15" Mobile Housing Parts Identification Detail.	EPD-902
SUPPRESSION OF IGNITION NOISE IN MOBILE EQUIPMENT	68P856127
Noise Suppression	Page 1
Source	Page 1
Radio Equipment Power Source.	Page 1
Ignition.	Page 2
Resistance Type Suppressors	Page 2
Spark Plug Leads	Page 2
Contacts	Page 2
Coupling	Page 2
Distributor	Page 3
D-C Generating System	Page 3
Generator	Page 3
Voltage Regulator	Page 4
Gauges	Page 4
Oil Sender.	Page 4
Static Charges	Page 4
Bonding	Page 4
Counterphasing or Noise Balancing	Page 4
Summary	Page 5
Noise Identification and Suppression Chart	Page 6
Typical Noise Suppression Detail	69C854657

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MODEL CHART
CARRIER SQUELCH MOBILE AND AC UTILITY FM TWO-WAY RADIO SETS

CODE:

X = ONE ITEM INCLUDED

2 = TWO ITEMS INCLUDED

⧄ = ONE ITEM INCLUDED WITH FIVE (OR LESS) RADIO SETS

*REPRESENTS A SERIES OF MODELS AND NOT A SPECIFIC MODEL. THE SPECIFIC MODEL, AS STAMPED ON THE CHASSIS IS DETERMINED BY ITS APPLICATION.

ITEM	DESCRIPTION	REFERENCE DIAGRAM
TTD1000AA	TRANSMITTER, 1-FREQ.	63E856736
TTD1000AB	TRANSMITTER, 2-FREQ.	63E856736
*TRD1150AA/TA140BW	RECEIVER, 1-FREQ. 60 KC CHAN. SPACING	63E862494
*TRD1150AC/TA140BW-R2	RECEIVER, 2-FREQ. 60 KC CHAN. SPACING	63E862493
*TRD1150AB/TA140BS	RECEIVER, 1-FREQ. 30 KC CHAN. SPACING	63E862494
*TRD1150AD/TA140BS-R2	RECEIVER, 2-FREQ. 30 KC CHAN. SPACING	63E862493
TU117	POWER SUPPLY, VIBRATOR TYPE, 6/12 V DC	63E831716
TU117-F	POWER SUPPLY, VIBRATOR TYPE, 6/12 V DC, FRONT MOUNT	63E835298
TU189	POWER SUPPLY, A-C TYPE, 117 V AC	63D835279
TU212	POWER SUPPLY, VIBRATOR TYPE, 6/12 V DC	63D836037
TU212-F	POWER SUPPLY, VIBRATOR TYPE, 6/12 V DC FRONT MOUNT	63D836038
TU206	CONTROL PANEL, 1-FREQ. MIC. CONNECTOR AND SPEAKER	63E862103
TU206-C2	CONTROL PANEL, 2-FREQ. MIC. CONNECTOR AND SPEAKER	63E862103
TU208	CONTROL PANEL, 1-FREQ. MIC. CONNECTOR AND SPEAKER	
TU208-C2	CONTROL PANEL, 2-FREQ. MIC. CONNECTOR AND SPEAKER	
TU238	CONTROL PANEL, 1-FREQ. "QUIK-CALL" AND MIC. CON. & SPKR.	63E836073
TU239	CONTROL PANEL, 1-FREQ. WITH SPEAKER	
TU381	CONTROL PANEL, 1-FREQ. SPEAKER AND MICROPHONE	63E835263
TU381-C2	CONTROL PANEL, 2-FREQ. SPEAKER AND MICROPHONE	
TU353A	DYNAMIC MIC.	
TK163	SUB-PANEL AND INTERCABLING KIT	
TK364	FRONT PANEL	
K-9045	HOUSING	
RN1	CRYSTAL, TRANSMITTER CONTROL	
RM10	CRYSTAL, RECEIVER CONTROL	
G03	CRYSTAL RECEIVER I-F	
K-9322	ALIGNMENT TOOL KIT	

MODEL	NO. OF RCVR. FREQ.	NO. OF XMTR. FREQ.	CHAN. SPACING	ACCESSORY GROUP	TTD1000AA	TTD1000AB	*TRD1150AA/TA140BW	*TRD1150AC/TA140BW-R2	*TRD1150AB/TA140BS	*TRD1150AD/TA140BS-R2	TU117	TU117-F	TU189	TU212	TU212-F	TU206	TU206-C2	TU208	TU208-C2	TU238	TU239	TU381	TU381-C2	TU353A	TK163	TK364	K-9045	RN1	RM10	G03	K-9322
10 WATT FRONT MOUNT																															
D33GGV1001BM	1	1	60 KC	BK1000 SERIES	X		X								X	X									X		X	X	X	X	⧄
D33GGV1001BQ	1	1	60 KC	BK1000 SERIES	X		X								X					X					X		X	X	X	X	⧄
D33GGV1011BM	1	2	60 KC	BK1000 SERIES		X	X								X		X								X		X	X	X	X	⧄
D33GGV1101BM	1	1	30 KC	BK1000 SERIES	X				X						X	X									X		X	X	X	X	⧄
D33GGV1101BQ	1	1	30 KC	BK1000 SERIES	X				X						X					X					X		X	X	X	X	⧄
D33GGV1111BM	1	2	30 KC	BK1000 SERIES		X			X						X		X								X		X	2	X	X	⧄
25 WATT FRONT MOUNT																															
D43GGV1001BM	1	1	60 KC	BK1000 SERIES	X		X					X				X								X	X		X	X	X	X	⧄
D43GGV1101BM	1	1	30 KC	BK1000 SERIES	X				X			X				X								X	X		X	X	X	X	⧄
D43GGV1001BQ	1	1	60 KC	BK1000 SERIES	X		X					X								X				X	X		X	X	X	X	⧄
D43GGV1101BQ	1	1	30 KC	BK1000 SERIES	X				X			X								X				X	X		X	X	X	X	⧄
D43GGV1031BM	2	2	60 KC	BK		X		X				X					X							X	X		X	2	2	X	⧄
D43GGV1131BM	2	2	30 KC	BK		X				X		X					X							X	X		X	2	2	X	⧄
D43GGV1011BM	1	2	60 KC	BK		X	X					X					X							X	X		X	2	X	X	⧄
D43GGV1111BM	1	2	30 KC	BK		X			X			X					X							X	X		X	2	X	X	⧄
D43GGV1031BM	2	2	60 KC	BK1000 SERIES		X		X				X					X							X	X		X	2	2	X	⧄
D43GGV1131BM	2	2	30 KC	BK1000 SERIES		X				X		X					X							X	X		X	2	2	X	⧄
10 WATT REAR MOUNT																															
T33GGV1001A	1	1	60 KC	EA1000 SERIES	X		X							X											X	X	X	X	X	X	⧄
T33GGV1101A	1	1	30 KC	EA1000 SERIES	X				X					X											X	X	X	X	X	X	⧄
T33GGV1011A	1	2	60 KC	EA1000 SERIES		X	X							X											X	X	X	2	X	X	⧄
T33GGV1111A	1	2	30 KC	EA1000 SERIES		X			X					X											X	X	X	2	X	X	⧄
T33GGV1031A	2	2	60 KC	EA		X		X						X											X	X	X	2	2	X	⧄
T33GGV1131A	2	2	30 KC	EA		X				X				X											X	X	X	2	2	X	⧄
25 WATT REAR MOUNT																															
T43GGV1001A	1	1	60 KC	EA1000 SERIES	X		X				X														X	X	X	X	X	X	⧄
T43GGV1101A	1	1	30 KC	EA1000 SERIES	X				X		X														X	X	X	X	X	X	⧄
T43GGV1011A	1	2	60 KC	EA1000 SERIES		X	X				X														X	X	X	2	X	X	⧄
T43GGV1111A	1	2	30 KC	EA1000 SERIES		X			X		X														X	X	X	2	X	X	⧄
T43GGV1031A	2	2	60 KC	EA1000 SERIES		X		X			X														X	X	X	2	2	X	⧄
T43GGV1131A	2	2	30 KC	EA1000 SERIES		X				X	X														X	X	X	2	2	X	⧄
25 WATT AC UTILITY																															
D43GGB1000A	1	1	60 KC	NONE	X		X						X					X							X		X	X	X	X	⧄
D43GGB1100A	1	1	30 KC	NONE	X				X				X					X							X		X	X	X	X	⧄
D43GGB1000AQ	1	1	60 KC	NONE	X		X						X								X				X		X	X	X	X	⧄
D43GGB1100AQ	1	1	30 KC	NONE	X				X				X								X				X		X	X	X	X	⧄
D43GGB1010A	1	2	60 KC	NONE		X	X						X						X						X		X	2	X	X	⧄
D43GGB1110A	1	2	30 KC	NONE		X			X				X						X						X		X	2	X	X	⧄
D43GGB1030A	2	2	60 KC	NONE		X		X					X						X						X		X	2	2	X	⧄
D43GGB1130A	2	2	30 KC	NONE		X				X			X						X						X		X	2	2	X	⧄

Motorola No. EPD-2867-O
1/15/60-CP

MOTOROLA

ACCESSORIES FOR
CARRIER SQUELCH
FM TWO-WAY RADIO
10 WATT & 25 WATT
VIBRATOR MODELS
144-174 MC

CODE:

X = ITEMS INCLUDED IN ACCESSORY GROUP.

O = INCLUDED ITEM, CHOICE DEPENDENT ON FREQUENCY

ITEM	DESCRIPTION	REFERENCE DIAGRAM
TCN6001AA	CONTROL HEAD WITH "WIRED-IN" MICROPHONE (1-FREQ.)	63E839323
TCN6001AB	CONTROL HEAD WITH "WIRED-IN" MICROPHONE (2-FREQ.)	63E839323
TCN6001AE	CONTROL HEAD WITH RECEPTACLE FOR "PLUG-IN" MIC. (1-FREQ.)	63E839323
TCN6001AF	CONTROL HEAD WITH RECEPTACLE FOR "PLUG-IN" MIC. (2-FREQ.)	63E839323
TKN6004A	CABLE KIT (6 VOLT) FOR REAR-MOUNT MODELS	63E839323
TKN6006A	CABLE KIT (12 VOLT) FOR REAR-MOUNT MODELS	63E839323
TU324A	3 OHM PM SPEAKER	63E839323
TU433A-6V	6 VOLT POWER VOICE SPEAKER	
TU433A-12V	12 VOLT POWER VOICE SPEAKER	
TLN6000A	INSTALLATION KIT	63E839323
TU316-L	ANTENNA (144-152 MC)	
TU316-M	ANTENNA (152-162 MC)	
TU316-H	ANTENNA (162-174 MC)	
TK190	CABLE KIT (6 VOLT) FOR FRONT-MOUNT MODELS	63E836073
TK191	CABLE KIT (12 VOLT) FOR FRONT-MOUNT MODELS	63E836073
TLN6001A	MOUNTING KIT (FOR FRONT-MOUNT MODELS)	

GROUP NUMBER	TYPE OF INSTALLATION	NO. OF FREQS.	CONTROL HEAD	MICRO-PHONE	SPEAKER	TCN6001AA	TCN6001AB	TCN6001AE	TCN6001AF	TKN6004A	TKN6006A	TU324A	TU433A-6V	TU433A-12V	TLN6000A	TU316-L	TU316-M	TU316-H	TK190	TK191	TLN6001A
EA1000A	6V REAR-MOUNT	1	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM	X				X		X			X	O	O	O			
EA1001A	6V REAR-MOUNT	1	"WIRED-IN" MIC.	SUPPLIED	POWER VOICE	X				X			X		X	O	O	O			
EA1005A	6V REAR-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM			X		X		X			X	O	O	O			
EA1006A	6V REAR-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE			X		X			X		X	O	O	O			
EA1007A	6V REAR-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM			X		X		X			X						
EA1010A	6V REAR-MOUNT	2	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM		X			X		X			X	O	O	O			
EA1011A	6V REAR-MOUNT	2	"WIRED-IN" MIC.	SUPPLIED	POWER VOICE		X			X			X		X	O	O	O			
EA1015A	6V REAR-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM				X	X		X			X	O	O	O			
EA1016A	6V REAR-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE				X	X			X		X	O	O	O			
EA1017A	6V REAR-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM				X	X		X			X						
EA1100C	12V REAR-MOUNT	1	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM	X					X	X			X	O	O	O			
EA1101C	12V REAR-MOUNT	1	"WIRED-IN" MIC.	SUPPLIED	POWER VOICE	X					X			X	X	O	O	O			
EA1105B	12V REAR-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM			X			X	X			X	O	O	O			
EA1106B	12V REAR-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE			X			X			X	X	O	O	O			
EA1107B	12V REAR-MOUNT	1	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM			X			X	X			X						
EA1110C	12V REAR-MOUNT	2	"WIRED-IN" MIC.	SUPPLIED	3 OHM PM		X				X	X			X	O	O	O			
EA1111C	12V REAR-MOUNT	2	"WIRED-IN" MIC.	SUPPLIED	POWER VOICE		X				X			X	X	O	O	O			
EA1115B	12V REAR-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM				X		X	X			X	O	O	O			
EA1116B	12V REAR-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	POWER VOICE				X		X			X	X	O	O	O			
EA1117A	12V REAR-MOUNT	2	FOR PLUG-IN MIC.	LESS MIC.	3 OHM PM				X		X	X			X						
BK1000A	6V FRONT-MOUNT	—	—	—	—											O	O	O	X		X
BK1007A	6V FRONT-MOUNT	—	—	—	—											O	O	O	X		X
BK1100A	12V FRONT-MOUNT	—	—	—	—											O	O	O		X	X
BK1107A	12V FRONT-MOUNT	—	—	—	—											O	O	O		X	X

EPD-1895

DESCRIPTION

1. INTRODUCTION

Mobile and A-C Utility Radio Set models of the Motorola 150-174 mc FM two way radio equipment consists basically of transmitter, receiver and power supply chassis mounted in a mobile type housing. The essential difference in the two classes of equipment occurs in the type of power supply used. Models designed for mobile application are equipped with power supplies which operate from a 6 v dc or 12 v dc primary power source; models designed for operation from a fixed position as an a-c utility station include a 117 v ac operated power supply. Mobile models are available for either front or rear mounting; the a-c utility models are primarily intended for desk-top or other suitable fixed installations.

The models, identified as the T43GGV, T33GGV, D43GGV or D33GGV Series, consist of a basic radio set which includes the transmitter, receiver and vibrator power supply assembled in a drawer type housing, plus an accessory group which supplements the basic items with specific accessories determined by operating requirements. Radio set model variations are dependent upon the transmitter power output, degree of receiver selectivity and the number of channels on which the equipment is intended to operate (one or two frequencies). Any mobile radio set may be operated from either a 6.3 v dc or 12.6 v dc primary power source when installed with the appropriate cable kit. Variations in the accessory group are based on the primary power source, transmitter power output, the number of operating frequencies, handset or microphone and specific omissions of various accessory items.

The T43GGV Series of mobile models provides 25 watts of transmitter power output and are designed for rear vehicular mounting.

The D43GGV Series of mobile models provides 25 watts of transmitter power output and are designed for front vehicular mounting.

The T33GGV Series of mobile models provides 10 watts of transmitter power output using a vibrator power supply. These models are designed for rear vehicular mounting.

The D33GGV Series of mobile models provides 10 watts of transmitter power output using a vibrator power supply. These models are designed for front vehicular mounting.

The D43GGB Series of a-c utility equipment provides 25 watts of transmitter power output and are designed for desk-top or similar fixed installations.

The front mount mobile and a-c utility equipment with provisions for "quik-call" operation differs slightly from the other standard models. Models with "quik-call" equipment use a speaker "L" pad on the control head or control panel. The control panel of front mount and a-c utility models for "quik-call" operation also have connectors for connecting the "quik-call" receiver decoder unit which is available as a separate item.

When properly installed and operating these models will provide dependable two-way communications with any land and/or mobile station operating within range and on the same frequency.

MOTOROLA INC. COMMUNICATIONS DIVISION
Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

2. DESCRIPTION OF RADIO SET ITEMS

a. Housing

The K-9045 Housing measures approximately 9-7/8" wide by 18-1/4" deep by 6" high overall. This housing is used with all the radio set models.

b. Front Panels

The TK364 Front Panel is used with the K-9045 Housing. The units are assembled to sub-panels to constitute the exterior front panel for the drawer type units. The panels serve also as the front end covers for housings. A key lock is provided on each panel to lock the drawer units in the housings. A handle is also mounted on the panels for convenience in removing the equipment from the housing and for carrying purposes.

c. Sub-panel and Intercabling Kits

The TK163 Sub-panel and Intercabling Kit is used with the K-9045 Housing. The sub-panels in these kits are used to assemble the transmitter, receiver and power supply together for installation in the housing. With the front panel, the assembled combination constitutes the drawer type unit for the mobile housing assembly. The antenna interconnect cables and connectors are also included with this kit. Cable receptacles for connection of external cables are assembled to the front sub-panel.

d. Control Panel

The control panel is an integral part of all front mount and a-c utility models and is shown on the radio set intercabling diagram. The control panel provides all the control facilities required to manually operate the radio equipment. Control panels vary with different models and their application such as, mobile or a-c utility, with or without microphone or handset, or additional connectors required for "quik-call" application.

For rear-mount radio sets, refer to the radio set intercabling and to the instructions furnished with the control head used.

e. Crystals

The RN1 Crystal is the frequency control element for the transmitter units. This crystal is available for any frequency within the 144-174 megacycle band.

The RM10 crystal is the primary frequency control element for the receivers. The GO4 is the receiver i-f crystal for the 144-174 megacycle frequency band.

These crystals are not part of the transmitter or receiver chassis but are separate items of the overall radio set models. When ordering an individual chassis, crystal type numbers and operating frequency must be specified.

3. DESCRIPTION OF STANDARD ACCESSORIES

a. Control Heads and Microphones

The control head provides the control facilities necessary to operate the trunk mount mobile station radio equipment from a dashboard location. Various model control heads, with and without a microphone, are available.

Refer to the instructions supplied with the control head and microphone used.

b. Loudspeaker

Standard trunk mount mobile models are supplied with a TU324-A Firewall Mounting Speaker. This unit includes a 5" diameter, 3 ohm permanent magnet speaker, mounted in a metal housing. An 8 foot speaker lead is provided for connection to the control head.

Refer to instructions packed with the speaker for installation details.

c. Cable Kits

The cable kit supplied with any mobile accessory group includes the external cables necessary for installation, plus fuses. The cable kit supplied for trunk mount installations also include an "A" power relay. Different types of cable kits are used with various models depending upon the transmitter power output and the primary power source. Cable kits are shown on the accessory group chart at the front of this manual.

d. Installation Kits

An installation kit is supplied with all models. The kit includes a noise suppressor, by-pass capacitors, cable clamps and all the mounting hardware required for the installation.

e. Antenna

The TU316 Roof Top Antenna includes a quarter wavelength stainless steel rod with associated 14 foot coaxial "lead-in" cable. The unit is expressly designed for standard vehicle roof top installation. The antenna is used with both front and trunk mount mobile equipment. Complete installation instructions for this antenna are included with the antenna.

Refer to the instructions packed with the antenna for mounting details.

4. OPTIONAL ACCESSORIES

a. Portable Test Set

The Motorola Model TU546 Series Portable Test Sets provide the metering necessary to align and check Motorola communications transmitters and receivers. Test sets which include a peaking generator are available to provide a signal source for complete receiver alignment. The portable test sets are battery operated and include a multiple scale, direct reading meter.

The P-7208 Wattmeter Load is designed to be used with a portable test set or a 0-50 microampere meter with an equivalent series resistance of 20000 ohms, to measure r-f power output. The unit has a standing wave ratio of less than 1.2 over a frequency range of 25-174 mc and a nominal impedance of 50 ohms. A calibration chart is supplied for use in correlating power dissipated in the load and the meter reading.

b. P-7234 Series Cowl Mounted Antenna

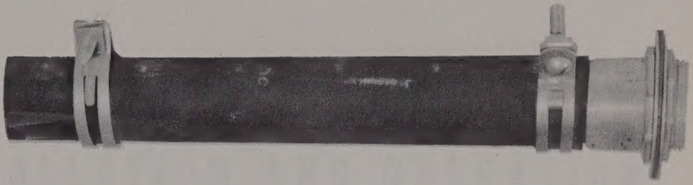
The P-7234 Series Cowl Mounted Antenna is available on special order. The cowl mounted antenna may be ordered in either the sectional rod or solid rod styles. The operating frequency must be specified when ordering this type antenna.

c. P-346 Generator Filter

The P-346 Generator Filter is intended for mobile units equipped with vhf receivers to eliminate generator interference. The filter is rated at 40 amperes.

d. K-8699 Series Cable Outlet Kits

The K-8699-A Cable Outlet Kit provides a weatherproof entrance for equipment cables when the radio set is installed in a weatherproof housing. It consists of hose, coupling connections, jacket, cable clamps and mounting hardware for a weatherproof cable outlet.



K-8699-A CABLE OUTLET FITTING

The K-8699-B Kit consists of a hood-like cover and hardware for use with the K-8699-A cable outlet kit for a splashproof connection.

e. K-8413 Shock Mounting Kit

The K-8413 Shock Mounting Kit is designed for shock mounting the K-8455-B Mobile Housing. The shock is greatly reduced by the use of rubber-type shock mountings.

f. TLN6002A Mounting Kit

The TLN6002A Mounting Kit is designed for mounting the K-8455-B Mobile Housing rigidly in position.

g. K-7257 Extension Cable

A K-7257 Extension Cable is available for use with either 25-30 watt or 50-60 watt mobile trunk mount equipment. This cable provides a direct ground return from the mobile housing to the vehicular battery. The cable is 17 feet long.

h. Long Cable Kits

Cable kits are available with 20' power and control cables instead of the standard 17' length for all trunk mount models. These cable kits are applicable for limousine or truck type installations. These cable kits are interchangeable with standard cable kits of corresponding application.

i. Detachable Microphones and Handset

Various microphone and handset models are available for use with control units incorporating the microphone connector. All are terminated in a four-contact male connector.

For information concerning these units, refer to the instructions furnished with the microphone or handset used.

INSTALLATION AND OPERATION

INSTALLATION

1. MOBILE RADIO SETS

Installation instructions are packed and shipped with the mobile radio set accessories. However, the installation instructions for the A-C Utility Radio Sets are covered in the following paragraph. Functional diagrams and intercabling diagrams for the radio sets are included in this section.

2. A-C UTILITY RADIO SETS

The A-C Utility Station equipment is complete in its housing and needs no special installation. Connect the antenna, and microphone to receptacles located on the control panel. Plug the a-c power cord into an 117 volt, 60 cps, outlet. It is desirable to ground the radio set housing with a wire connected to an object such as a water pipe or rod driven into the ground.

OPERATION

1. MOBILE RADIO SETS

Operation instructions are packed and shipped with the mobile radio set accessories.

2. A-C UTILITY RADIO SETS--PRE-OPERATIONAL CHECKS AND ADJUSTMENTS

a. Purpose

The purpose of the pre-operational check is to ascertain that the radio set is operating properly when initially placed in service.

The equipment has been accurately aligned at the factory for optimum performance. It is possible, however, that mishandling in transit may have disturbed some of the adjustments. It is essential, therefore, that a pre-operational check be made to assure proper operation when the equipment is installed.

b. Installation Checks

Before placing this radio set in operation make the following installation checks:

(1) General

Be sure all cable connections and bolted connections are secure. Make sure all fuses are in place and all tubes are firmly seated.

(2) A-C Input

(a) Be sure the equipment is connected

to the proper voltage. Turn the OFF-VOLUME control clockwise. This applies voltage to the radio set.

(b) The green pilot lamp should be lit and all tube filaments should be energized. To check filaments, unlock the drawer assembly and slide the drawer out and lift the top of the housing. After making this check keep the radio set open for the following checks.

(3) Check Receiver

(a) Meter Readings

Check receiver meter readings against the stage measurement chart in the RECEIVER section (no signal readings only). Use the Motorola portable test set or equivalent 0-50 microamp. test meter. The cable of the portable test set plugs directly into the receiver metering socket. Check meter readings in the various test positions as indicated on the chart. If any of the readings are beyond the given limits, re-align the receiver as described in the RECEIVER section.

(b) Check for Normal Operation

With the receiver properly aligned, the a-c input applied to the equipment and the antenna connected, the receiver should be in full operation. Check for proper operation as follows: Turn the VOLUME control to the full clockwise position. Turn the SQUELCH control to the full counterclockwise position (open). You should hear either a loud, rushing noise in the speaker or signals from any on-frequency station which may be on the air at this time. In the absence of any received signals the loud, rushing noise is a normal indication of receiver operation with "open" squelch.

(c) To Set the VOLUME Control

There are two controls involved in adjusting the audio level to the speaker. These controls must be adjusted in the presence of a normal, fully deviated signal from the base station transmitter (or other mobile located at an average distance). To adjust these controls proceed as follows:

With a signal being received, set the VOLUME control on the control head to maximum volume (fully clockwise). Then adjust the audio level control on the receiver chassis to a setting just below the point where distortion becomes audible. Now, reset the control head VOLUME control for the desired listening level.

The use of two controls in the audio circuits permits future readjustment of the speaker level at the control head without resetting the receiver audio level control.

(d) To Set the SQUELCH Control

Turn the SQUELCH control in the clockwise direction until the noise is squelched (cuts out).

(4) FCC Regulations

The operation of the transmitter in this radio set is covered by FCC rules and regulations. Several provisions of these rules are briefly summarized in this paragraph. For complete information, refer to the current FCC regulations covering the applicable type of service and equipment. FCC regulations excerpts:

(a) Transmitter frequency and deviation must be checked before a transmitter is placed in service and at least every six months thereafter. A suitable procedure shall be employed to ascertain that the transmitter is on the assigned carrier frequency and that the transmitter crystal actually controls the frequency of the radiation. Modulation deviation is limited to ±15 kc for 40 kc, 60 kc and 120 kc channel spacing operation and to ±5 kc for 20 kc and 30 kc channels.

(b) The r-f power output of a transmitter shall be no more than required for satisfactory technical operation considering the conditions of its use.

(c) Only duly authorized radio operators or personnel working directly under their supervision may tune or adjust a radio transmitter.

(5) Check Transmitter

(a) Operational Check

The transmitter must be checked for proper operation before the equipment can be placed in service. Connect a dummy load lamp, r-f wattmeter or the regular mobile radio set antenna to the ANTENNA receptacle on the front panel. Set the HI-LO switch on the power supply chassis to the HI position. Press the microphone push-to-talk button momentarily and listen for relay operation. The transmit-receive relay on the power supply chassis and the antenna relay on the transmitter chassis must operate. Check for indication of r-f power output. The dummy load lamp should glow or the r-f wattmeter, if used, will show the r-f power output. If the regular mobile antenna is used, the transmitter should radiate signals to receivers of other sets on the same frequency.

CAUTION

Do not key the transmitter more than a few seconds at a time while making these operational tests.

If the operational test is satisfactory, proceed to the next step. If there is no indication of r-f output, some troubleshooting must be done before proceeding. The simplified functional diagram in this section shows the overall operation of the radio set and gives the step-by-step sequence of operations. The intercabling diagrams trace the various circuits from chassis-to-chassis. Schematic diagrams of each chassis are included in the various sections of the manual. With these diagrams, the technician can understand how the radio set works and can isolate troubles to a specific chassis or stage thereof.

(b) Meter Readings

Refer to the alignment procedure in the TRANSMITTER section of this manual. With the HI-LO switch in the HI position check meter readings against the values given in the FINAL METER READINGS CHART. The transmitter must be keyed to obtain readings. Use the microphone push-to-talk button or the switch on the Motorola portable test set. To check readings consult the chart and set the switch to a given position. Then key the transmitter just long enough to observe the reading. Readings can be taken in any order. If the readings in positions 2, 3, 4, 5 or 6 are below the minimum values given, re-align the transmitter as described in the alignment procedure. The reading in the PA position is not too important at this point, however, if it is above the maximum value given, do not key the transmitter any more than absolutely necessary.

It is advisable to follow the complete alignment procedure at this point, since the next step requires a repeak of the transmitter adjustments to obtain full r-f output.

(c) Loading to Antenna

Set the HI-LO switch to LO and load the transmitter to the antenna as described in the last three steps of the alignment procedure.

c. Deviation Check

FCC regulations require a deviation check before a transmitter is placed in service. This check is described in the TRANSMITTER section.

3. OPERATOR'S INSTRUCTIONS

a. To Turn "ON" Equipment:

Turn the OFF-VOLUME control clockwise or place the ON-OFF switch to ON. The green indicator will become illuminated. The receiver is now in full operation and the transmitter filaments are "on".

NOTE

If multi-channel transmitter and/or receiver is used, place frequency selector switch in desired frequency position.

b. To Receive:

(1) Turn the VOLUME control to the full clockwise position.

(2) Turn the SQUELCH control to the full counterclockwise position.

(3) Adjust the SQUELCH control, by turning the control slowly clockwise until the noise is just squelched (cuts out). Turning the control beyond this point will increase the minimum signal necessary to open the squelch circuit.

(4) Set the control head VOLUME control to the desired speaker level with a received signal.

c. To Transmit:

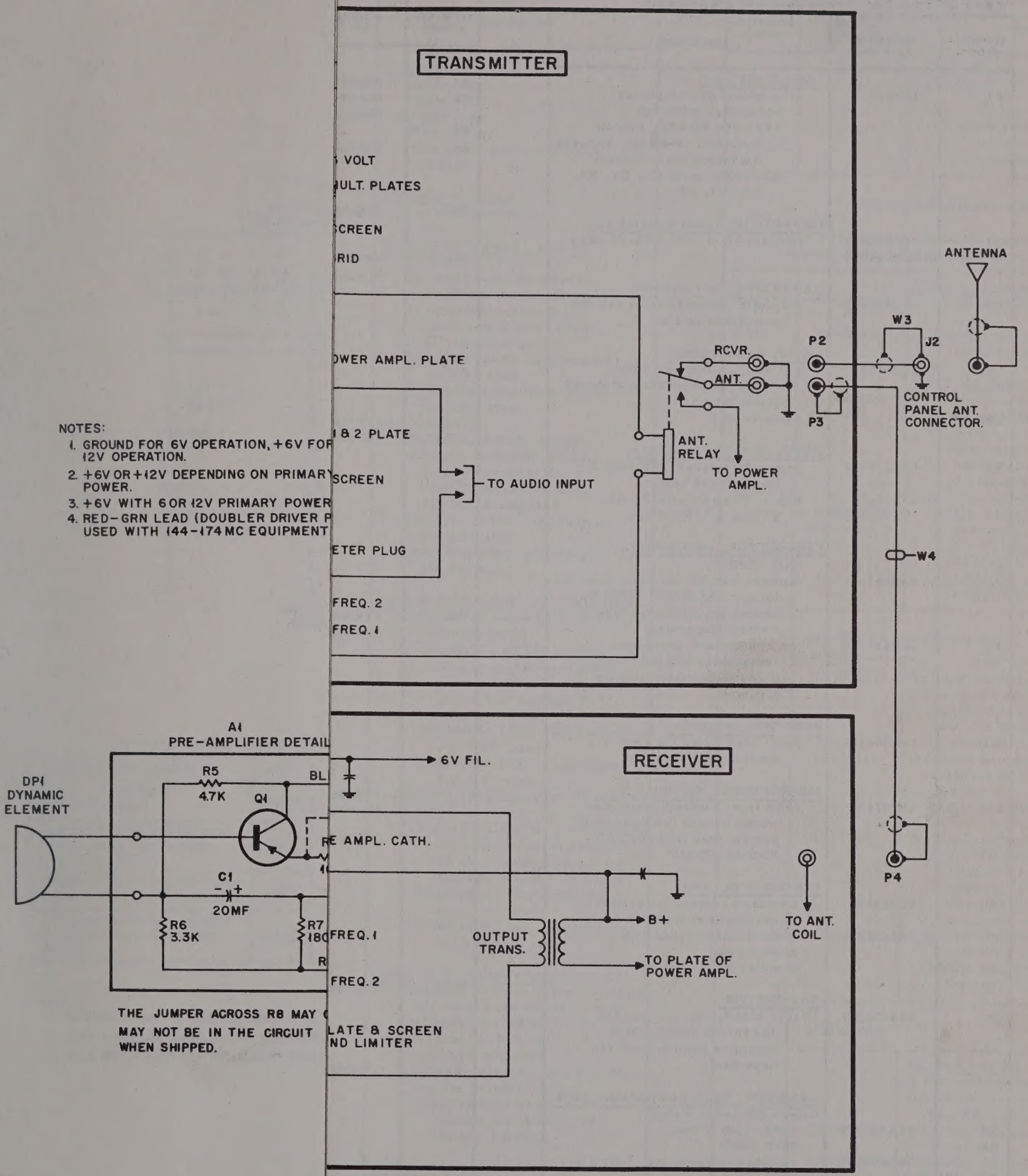
(1) Remove the microphone from the hanger bracket and press the push-to-talk button. The red indicator lamp will become illuminated, indicating the transmitter is "on". If a military or noise cancelling type microphone is used, hold the microphone at approximately a 30° angle from the lips and speak clearly and distinctly across the microphone in a normal or loud voice. If a handset microphone is used, speak directly into the mouthpiece of the handset. The transmitter cannot be over-modulated by speaking loudly.

(2) To receive reply, release the push-to-talk button. The red indicator lamp will go "off" indicating that the transmitter circuits are no longer energized. The received reply may now be heard over the speaker and/or the handset earpiece (if used).

(3) When the transmission is completed, release the push-to-talk button and hang the microphone on the hanger bracket.

d. To Turn "OFF" the Equipment:

Turn the OFF-VOLUME control counter-clockwise or place the ON-OFF switch to OFF. The green lamp will be turned "off".



NOTES:
1. GROUND FOR 6V OPERATION, +6V FOR 12V OPERATION.
2. +6V OR +12V DEPENDING ON PRIMARY POWER.
3. +6V WITH 6 OR 12V PRIMARY POWER
4. RED-GRN LEAD (DOUBLER DRIVER P USED WITH 144-174 MC EQUIPMENT

THE JUMPER ACROSS R8 MAY MAY NOT BE IN THE CIRCUIT WHEN SHIPPED.

D43GGV Series Radio Sets
With D-C Type Volume Control
And Wired-In Microphone
Intercabling Diagram
Motorola No. 63E835263-H
1/15/60-CP

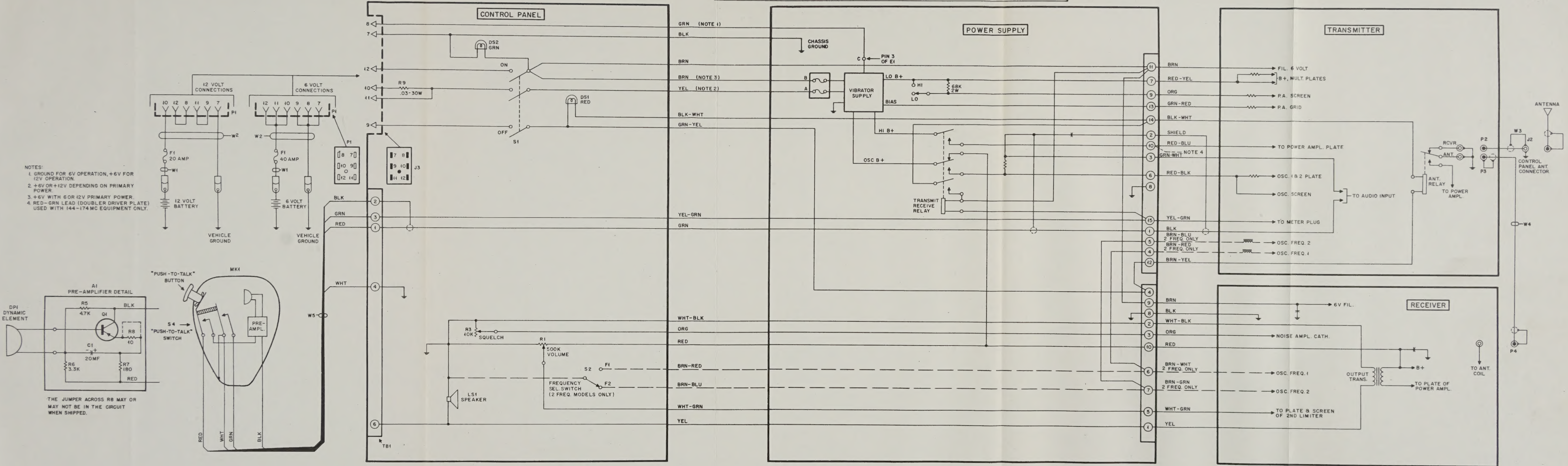
(2) To receive reply, release the push-to-talk button. The red indicator lamp will go "off" indicating that the transmitter circuits are no longer energized. The received reply may now be heard over the speaker and/or the handset earpiece (if used).

(3) When the transmission is completed, release the push-to-talk button and hang the microphone on the hanger bracket.

d. To Turn "OFF" the Equipment:

Turn the OFF-VOLUME control counterclockwise or place the ON-OFF switch to OFF. The green lamp will be turned "off".

REFER TO THE INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS

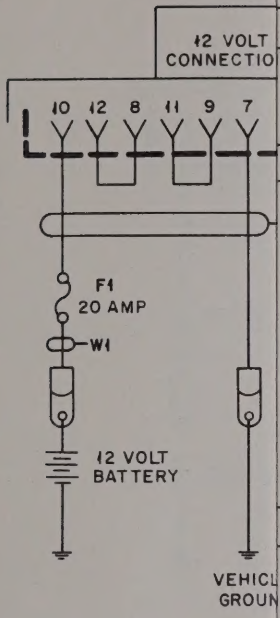


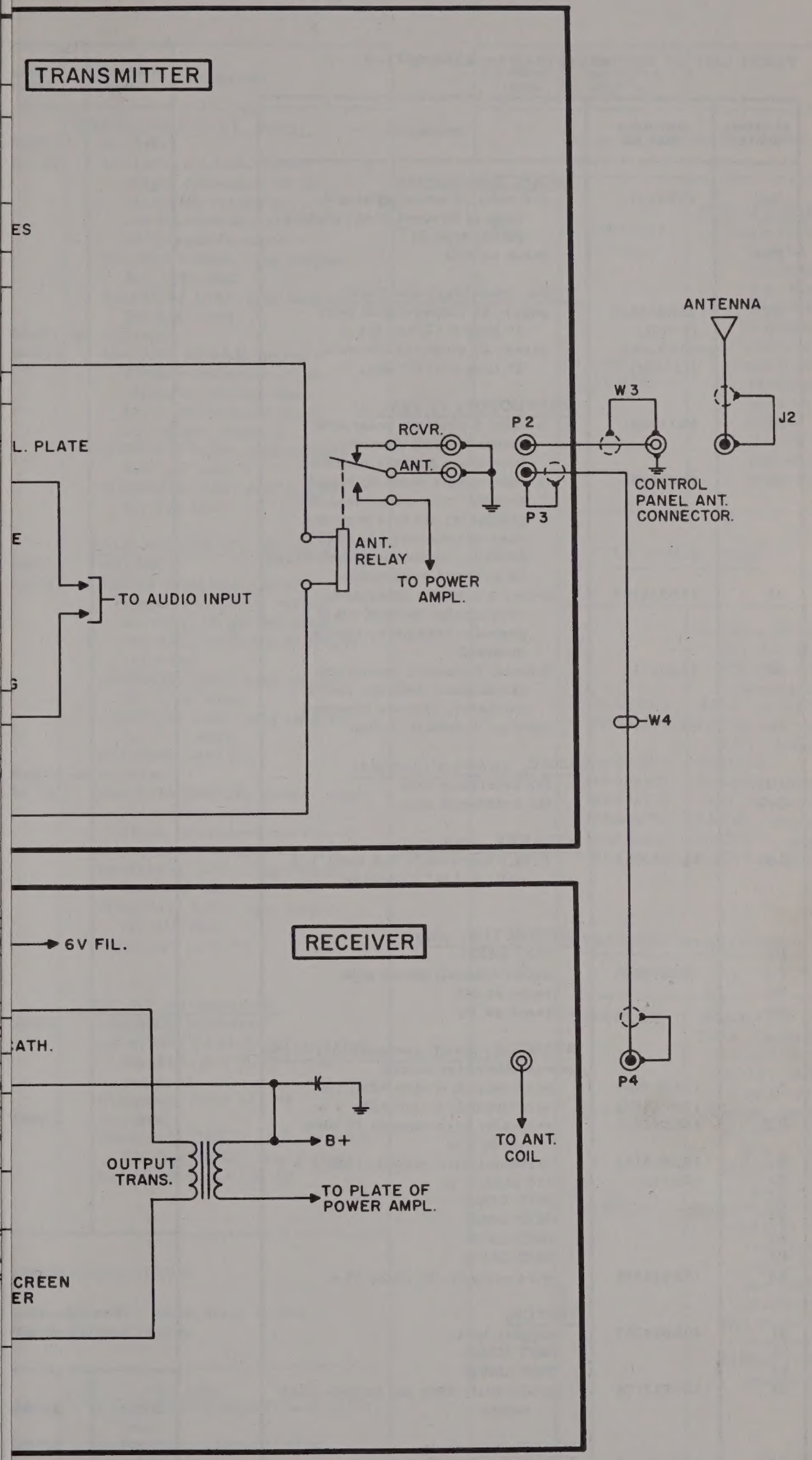
NOTES:

1. GROUND FOR 6V OPERATION, +6V FOR 12V OPERATION.
2. +6V OR +12V DEPENDING ON PRIMARY POWER.
3. +6V WITH 6 OR 12V PRIMARY POWER.
4. RED-GRN LEAD (DOUBLER DRIVER PLATE) USED WITH 144-174 MC EQUIPMENT ONLY.

THE JUMPER ACROSS R8 MAY OR MAY NOT BE IN THE CIRCUIT WHEN SHIPPED.

D43GGV Series Radio Sets
With D-C Type Volume Control
And Wired-In Microphone
Intercabling Diagram
Motorola No. 63E835263-H
1/15/60-CP





CONTROL PANEL JUMPER TABL

CIRCUIT OPERATION	JU1	J
BASIC OPERATION (HANDSET ONLY	USED	U
HANDSET & HANG-UP BOX (QUIK-CALL NOT USED) SPEAKER MUTED	OMIT	O
HANDSET & HANG-UP BOX & QUIK-CALL. SPKR. MUTED.	OMIT	O
HANDSET & HANG-UP BOX & QUIK-CALL SPKR. NOT MUTED.	USED	O

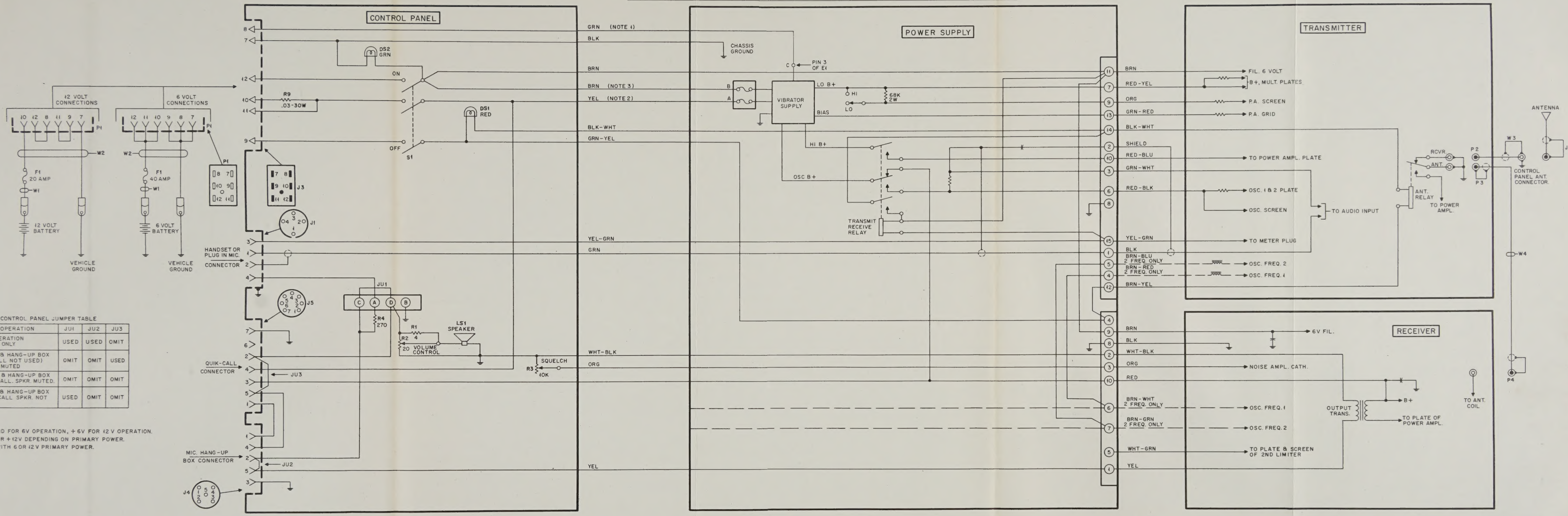
NOTES:
1. GROUND FOR 6V OPERATION, +6V F
2. +6V OR +12V DEPENDING ON PRIMA
3. +6V WITH 6 OR 12 V PRIMARY POWEF

D43GGV Series Radio Sets
With Speaker Pad Type Volume Control
And Provisions for "Quik-Call"
Intercabling Diagram
Motorola No. 63E836073-D
1/15/60-CP

PARTS LIST for Intercabling Diagram 63E835263-H

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		AMPLIFIER, AF:
A1	1V861317	microphone pre-amplifier; assembly, includes: 1V859594 BOARD, circuit: eyeleted; assembly; includes soldering lug terminals Reference parts C1, Q1, R5, R6, R7, R8
		CAPACITOR, fixed: electrolytic;
C1	23C855013 or 23B844927	tubular; 20 uf +100-10%; 25 vdcw
		CARTRIDGE, microphone:
DP1	59C852603	magnetic; dynamic type; 175 ohm impedance at 1 kc
		LAMP, incandescent:
DS1	65R4151	6-7 volt; .2 ampere; single contact bayonet base; globular glass; type 51
DS2		same as DS1
		FUSE, cartridge: one time;
F1	65K830314 (6 volt)	paper; 40 ampere; 250 volt; 3" long x 13/16" dia.
	or 65K52482 (12 volt)	paper; 20 ampere; 250 volt; 2" long x 9/16" dia.
		CONNECTOR, receptacle:
J1		NOT USED
J2	9A85615	female; coaxial; uhf type; does not include 15A483599 SHIELD, connector; shield must be ordered separately
J3	28B834755	male; 6 contact; polarized; rectangular molded black phenolic insulator; saddle mounted
		SPEAKER, magnetic:
LS1	50C800112	p-m; voice coil; 3.2 ohm; 1.5 watt; 4-3/4" diameter
		MICROPHONE, dynamic:
MK1	1V852400	palm type; contains transistor amplifier and "push-to-talk" switch; (see NON-REFERENCED ITEMS)
		CONNECTOR, plug:
P1	9B834756	female; 6 contact; polarized; rectangular; includes shell
P2	28A474006	male; coaxial; phono type
P3		same as P2
P4		same as P2
		TRANSISTOR:
Q1	48A124317	type MN60; does not include 14A861196 INSULATOR insulator must be ordered separately
		RESISTOR, fixed: composition; ±10%; unless otherwise stated
R1	18A822378	500K; 2.25 w max.
R2		NOT USED
R3	18D890193	variable: wire-wound; 10K; 2 w
R4		NOT USED
R5	6R6080	4.7K
R6	6R5581	3.3K
R7	6R5660	180 ohm
R8	6R5621	10 ohm
R9	17B834758	wire-wound: .03 ohm; 30 w
		SWITCH,
S1	40B834757	toggle: 3pst
S2	40A80248	toggle: spdt
	or 40K811824	toggle: spdt
S3		NOT USED
S4	40C857174	push: dpst; does not include push button
		BOARD, terminal:
TB1	31A890699	6 screw terminals
		CABLE ASSEMBLY, power:
W1	1V835443 (6 volt)	includes: 30A16396 CABLE, power single conductor: #8 ga.; stranded; rubber ins.; black cotton outer wrap; 24" length required 29K847817 LUG, ring tongue: for 3/8" stud 29K835302 LUG, ring tongue: for 1/4" stud
	or 1V835445 (12 volt)	includes: 30A16396 CABLE, power: single conductor; #8 ga.; stranded; rubber ins.; black cotton outer wrap; 24" length required 29K847817 LUG, ring tongue: for 3/8" stud 29K824434 LUG, ring tongue: for #10 stud
		CABLE ASSEMBLY, special purpose:
W2	1V835442 (6 volt)	includes reference part P1 and the following items: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 LUG, ring tongue: for 5/16" stud 29K835302 LUG, ring tongue: for 1/4" stud
	or 1V835444 (12 volt)	includes reference part P1 and the following items: 30A16396 CABLE, power; single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 LUG, ring tongue: for 5/16" stud 29K824434 LUG, ring tongue: for #10 stud
		LINE, R-F transmission:
W3	1V836807	assembly; includes reference parts J2, P2 and the following item: 30B475378 CABLE, R-F: coaxial; RG-58A/U; 7-1/2" length required
W4	1K800193	includes reference parts P3, P4 and the following item: 30B475378 CABLE, R-F: coaxial; RG-58A/U; 22" length required
		CORD, microphone:
W5	1V854006 ("wired-in" mic.)	includes: 30K852742 CORD, coiled; tinsel, 4 conductor 41A852707 SPRING, strain relief
		CORD, (cont'd) 11M2506 TUBING, extruded, #9 BLK; 1" length req'd 29A847033 LUG, terminal; wire mounted; insulation piercing; 8 req'd
NON-REFERENCED ITEMS The following are replaceable parts which do not appear on the intercabling diagram.		
		LIGHT, indicator:
XDS1	60A848400	single contact bayonet base; RED lens
XDS2	60K848401	single contact bayonet base; GREEN lens
		FUSEHOLDER:
XF1	67B83859 (6 volt)	single fuse mounting; rectangular ceramic base; chassis mounted; for 3" long x 13/16" dia. fuse; does not include 64A83861 PLATE, contact; 2 required; plates must be ordered separately
	or 67K892616 (12 volt)	single fuse mounting; rectangular porcelain base; chassis mounted for 2" long x 9/16" dia. fuse; does not include 32A880952 GASKET: gasket must be ordered separately
	TLN6000A Installation Kit	
	1V859627	includes the following items: Cable Clamp Kit: includes: 42A19376 CLAMP, cable: 4 req'd 3S7467 SCREW, tapping: #8 x 3/8" plain hex; 4 req'd
	1V849628	Mounting Hardware Kit: includes: 3S125947 SCREW, tapping: #14 x 3/4" plain hex; 4 req'd 4S119331 LOCKWASHER: 1/4" split; 4 required
	1V84019	Noise Filter Kit: includes: 8A821889 CAPACITOR, generator hash filter: fixed: paper; tubular; .5 uf ±20%; 150 vdcw; one lead grounded; one lead insulator; 2 supplied 6A4141 SUPPRESSOR, noise: resistor, screw type 4S7670 LOCKWASHER: 1/4" internal; 2 required
	Cable Kits	
		TK190 Cable Kit (6 volt installations) includes reference parts F1, W1, W2, XF1, and the following items:
	1V847705	Mounting Hardware Kit, fuseholder; includes:
	4A83863	WASHER, cushion: 2 required
	32A83862	GASKET: 1 required
	3S40065	SCREW, tapping: #10 x 3/4"; slotted round head; 2 req'd
	4S7658	LOCKWASHER: #10 int.; 2 req'd
	4S1706	WASHER, flat: 2 req'd
NON-REFERENCED ITEMS (cont'd)		
		TK191 Cable Kit (12 volt installation) includes reference parts F1, W1, W2, XF1 and the following items:
	1V474596	Mounting Hardware Kit, fuseholder includes:
	4A86863	WASHER, cushion: 2 required
	3S400465	SCREW, tapping: #10 x 3/4"; slotted round head; 2 required
	4S7658	LOCKWASHER: #10 int.; 2 req'd
	4S1706	WASHER, flat: 2 req'd
	TK163 Sub-Panel Kit	
		includes reference part W4 and the following items:
	64C802703	TIE PLATE, rear
	64C802701	TIE PLATE, front
	41A840794	SPRING, cushion (affixes to rear tie plate)
	TU381 (& TU381-C2) Control Panel	
		includes reference parts DS1, DS2, J2, J3, LS1, MK1, R1, R3, R9, S1, *S2, W3, and the following items:
	10A893869	WIRE, cover hinge; 2 required
	55A893871	LOCK, key: includes 55K893872 KEY, 2 keys supplied
	55A893873	HANDLE
	64K858229	SCREEN, speaker
	35B834775	CLOTH, speaker grille
	36B844653	KNOB, control: 2 required
	38K890353	BUTTON, plug: 1/2" (TU381 only)
		* (used in TU381-C2 only)
	1V16241	Mounting Kit, microphone: includes: 64A85596 BRACKET, microphone hang-up 3S122830 SCREW, tapping: #8 x 1/2"; 2 req'd
	1V852400 Microphone	
		includes reference parts A1, DP1, W5, and the following items:
	1V854005	BACK HOUSING AND HANG-UP STUD ASSEMBLY
	3S124693	LOCKSCREW: 6-32 x 1/4"; Phillips round head; 3 req'd
	42A852710	STRAP, strain relief
	38A852699	BUTTON, push
	15D852566	FRONT HOUSING
	13B852703	GRILLE
	35A852701	CLOTH, grille
	32B852702	GASKET, rubber
	14A857138	INSULATOR: used for insulating printed circuit assembly
	42A852705	CLAMP, used for securing microphone cartridge
	14A857137	INSULATOR: used between clamp and microphone cartridge
	4K852762	WASHER, insulating; used as a spacer
	3S127924	LOCKSCREW: 6-32 x 5/16"; Phillips round head
	3S127481	SCREW, machine: 6-32 x 7/8"; Phillips round head; 2 req'd
	4S400386	LOCKWASHER: #6 split; 2 req'd

REFER TO THE INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS

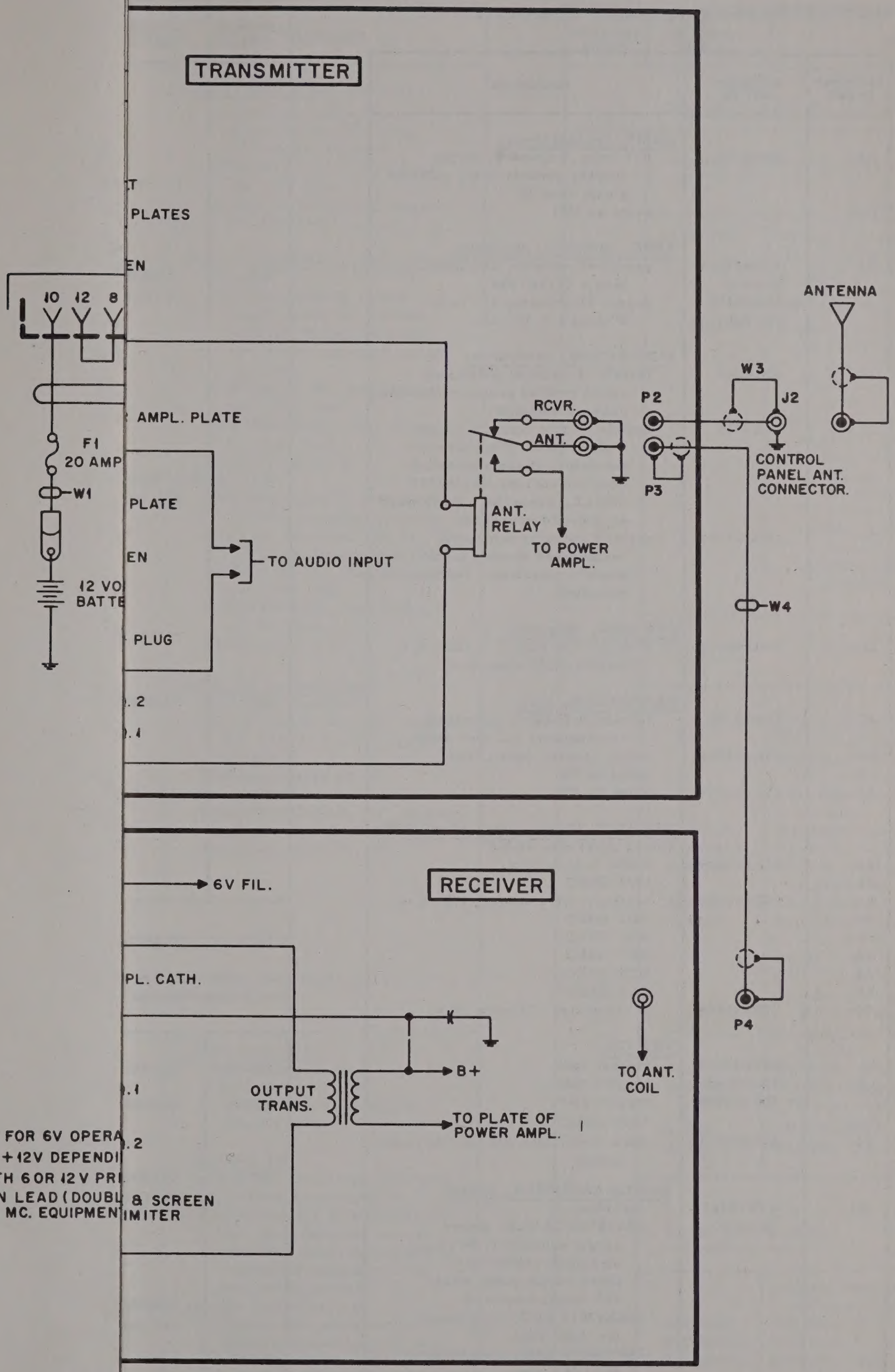


CONTROL PANEL JUMPER TABLE

CIRCUIT OPERATION	JU1	JU2	JU3
BASIC OPERATION (HANDSET ONLY	USED	USED	OMIT
HANDSET & HANG-UP BOX (QUIK-CALL NOT USED) SPEAKER MUTED	OMIT	OMIT	USED
HANDSET & HANG-UP BOX & QUIK-CALL. SPKR. MUTED.	OMIT	OMIT	OMIT
HANDSET & HANG-UP BOX & QUIK-CALL SPKR. NOT MUTED.	USED	OMIT	OMIT

NOTES:
1. GROUND FOR 6V OPERATION, +6V FOR 12 V OPERATION.
2. +6V OR +12V DEPENDING ON PRIMARY POWER.
3. +6V WITH 6 OR 12 V PRIMARY POWER.

D43GGV Series Radio Sets
With Speaker Pad Type Volume Control
And Provisions for "Quik-Call"
Intercabling Diagram
Motorola No. 63E836073-D
1/15/60-CP

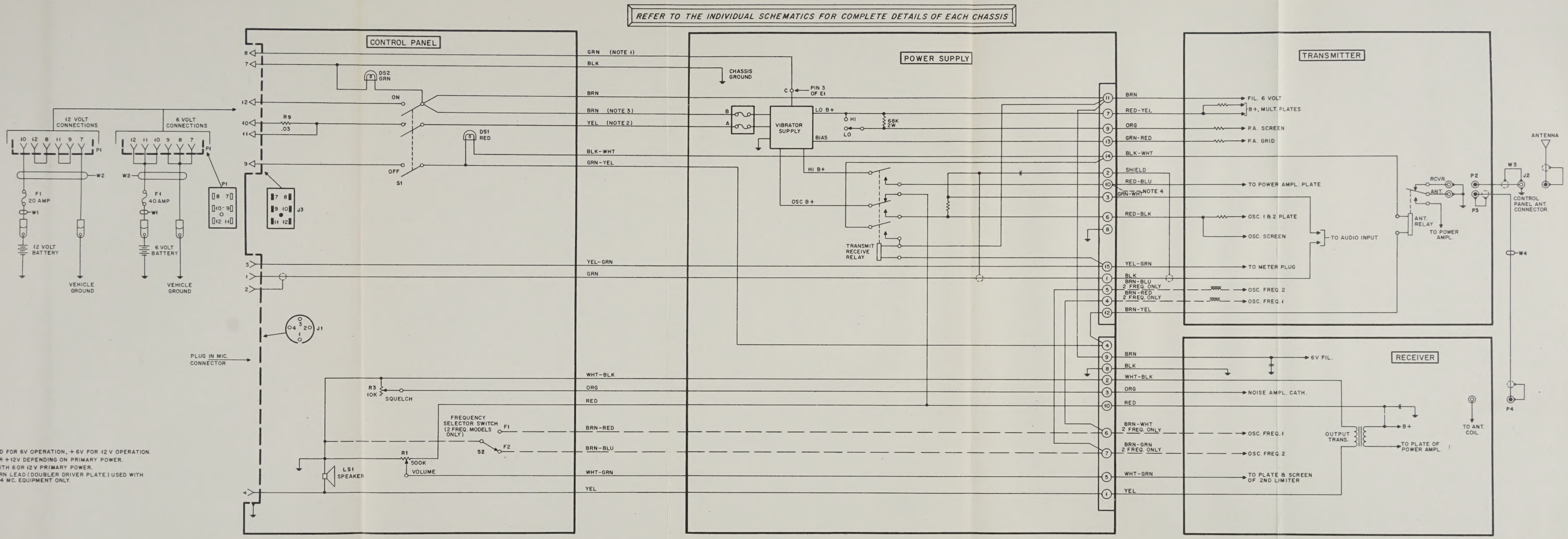


NOTES:
1. GROUND FOR 6V OPERA
2. + 6V OR + 12V DEPENDI
3. + 6V WITH 6 OR 12 V PR
4. RED-GRN LEAD (DOUBL
144-174 MC. EQUIPMEN

Front Mount Radio Sets
With D-C Type Volume Control
Intercabling Diagram
Motorola No. 63E862103-A
1/15/60-CP

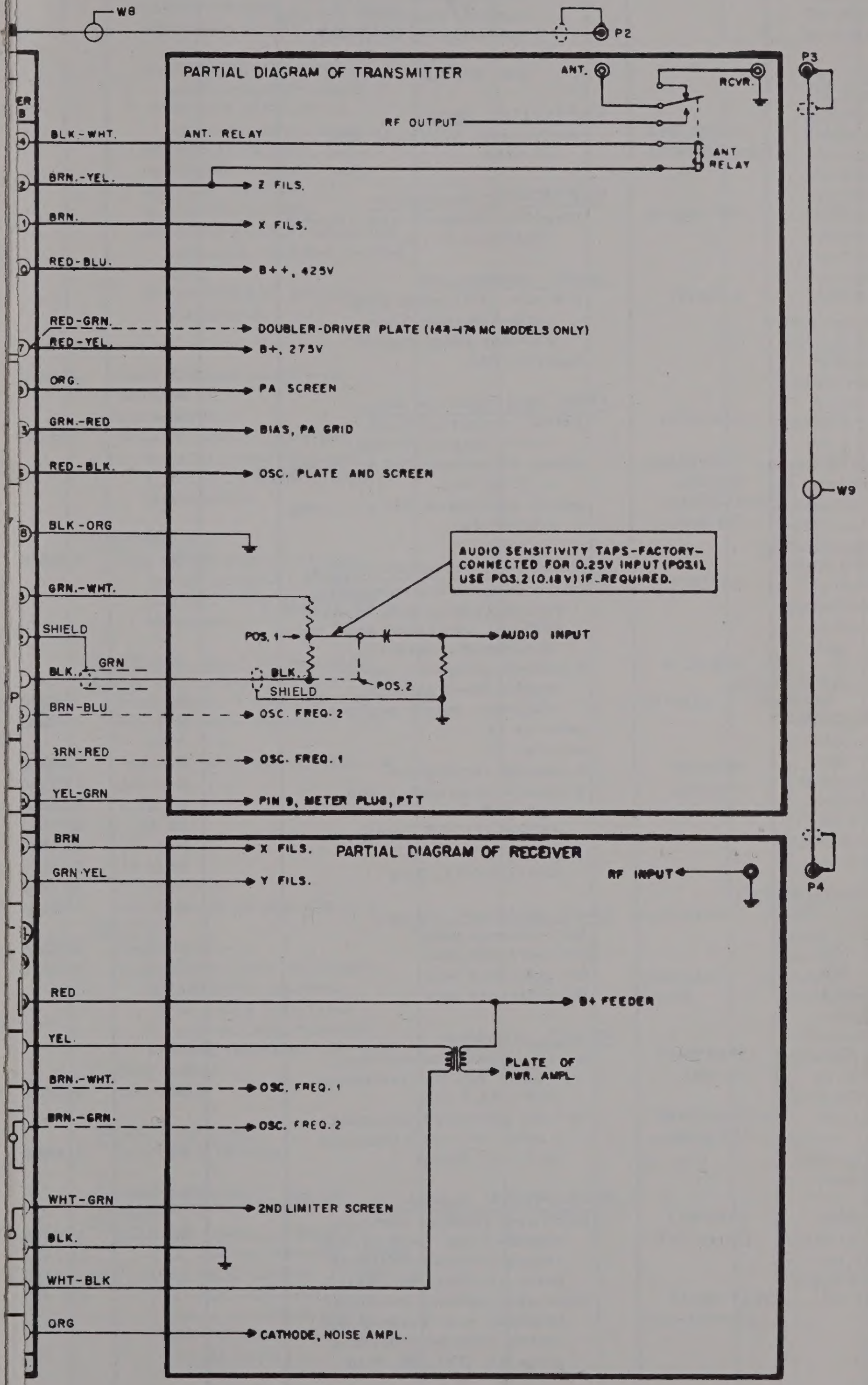
PARTS LIST for Intercabling Diagram 63E836073-D

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		LAMP, incandescent:
DS1	65R4151	6-8 volt; .2 ampere; single contact bayonet base; globular glass; type 51
DS2		same as DS1
		FUSE, cartridge: one time;
F1	65K830314 (6 volt)	paper; 40 ampere; 250 volt; 3" long x 13/16" dia.
	or65K52482 (12 volt)	paper; 20 ampere; 250 volt; 2" long x 9/16" dia.
		CONNECTOR, receptacle:
J1	9B16345	female; 4 contact; polarized; round molded phenolic insulator; chassis mounted
J2	9A85615	female; single contact; round molded mica filled bakelite insulator; chassis mounted does not include 15A483599 SHELL, connector; shell must be ordered separately
J3	28B834755	male; 6 contact; polarized; rectangular molded black phenolic insulator; saddle mounted
J4	9A802761	female; 5 contact; polarized; rectangular bakelite wafer insulator; chassis mounted
J5	9R119817	female; 7 contact; round
		LEAD, electrical: jumper;
JU1		for reference only
JU2		for reference only
		SPEAKER, magnetic:
LS1	50C800112	P.M.; voice coil; 3.2 ohm; 1.5 watt; 4-3/4" diameter
		CONNECTOR, plug:
P1		NOT USED
P2	28A474006	male; coaxial; phono type
P3		same as P2
P4		same as P2
		RESISTOR, fixed: composition; ±10%; unless otherwise stated
R1	17K892469	wire-wound; 4 ohm ±2%; 1 w
	or17B821901	wire-wound; 4 ohm ±2%; 3 w
R2	18K838263	variable: wire-wound; 20 ohm ±20%; 2 w
R3	18D890193	variable: wire-wound; 10K; 2 w
R4	6R6336	270 ohm; 1 w
R5		NOT USED
R6		NOT USED
R7		NOT USED
R8		NOT USED
R9	17B834758	wire-wound: .03 ohm; 30 w
		SWITCH,
S1	40B834757	toggle: 3pst
S2		NOT USED
S3		NOT USED
S4	40C857174	push: dpst; does not include push button
		BOARD, terminal:
TB1	31R121167	4 solder lug terminals: 3 insulated, 1 grounded
		CABLE ASSEMBLY, power:
W1	1V835443 (6 volt)	includes: 30A16396 CABLE, power single conductor; #8 ga.; stranded; rubber ins.; black cotton outer wrap; 24" length required 29K847817 LUG, ring tongue: for 3/8" stud 29K835302 LUG, ring tongue: for 1/4" stud
	or 1V835445 (12 volt)	includes: 30A16396 CABLE, power: single conductor; #8 ga.; stranded; rubber ins.; black cotton outer wrap; 24" length required 29K847817 LUG, ring tongue: for 3/8" stud 29K824434 LUG, ring tongue: for #10 stud
		CABLE ASSEMBLY, special purpose:
W2	1V835442 (6 volt)	includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 LUG, ring tongue: for 5/16" stud 29K835302 LUG, ring tongue: for 1/4" stud Reference part P1
	or 1V835444 (12 volt)	includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 LUG, ring tongue: for 5/16" stud 29K824434 LUG, ring tongue: for #10 stud Reference part P1
		LINE, RF transmission:
W3	1V836807	assembly; includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 7-1/2" length required Reference parts J2, P2
W4	1K800193	includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 22" length req'd Reference parts P3, P4
		NON-REFERENCED ITEMS The following are replaceable parts which do not appear on the intercabling diagram.
		LIGHT, indicator:
XDS1	60A848400	single contact bayonet base; RED lens
XDS2	60K848401	single contact bayonet base; GREEN lens
		NON-REFERENCED ITEMS (cont'd)
		FUSEHOLDER:
XF1	67B83859 (6 volt)	single fuse mounting; rectangular ceramic base; chassis mounted; for 3" long x 13/16" dia. fuse; does not include 64A83861 PLATE, contact; 2 required; plates must be ordered separately
	or 67K892616 (12 volt)	single fuse mounting; rectangular porcelain base; chassis mounted for 2" long x 9/16" dia. fuse; does not include 32A880952 GASKET: gasket must be ordered separately
	TU238 Control Panel	
		includes reference parts DS1, DS2, J1, J3, J4, J5, LS1, R1, R2, R3, R4, R9, S1, and the following items:
	10A893869	WIRE, cover hinge; 2 required
	55A893871	LOCK, key: includes 55K893872 KEY, 2 keys supplied
	55A893873	HANDLE
	64K858229	SCREEN, speaker
	35B834775	CLOTH, speaker grille
	36B844653	KNOB, control: 2 required
	38K824006	BUTTON, plug: 7/16"
	38K890353	BUTTON, plug: 1/2"
	TLN6000A Installation Kit	
	1V859627	includes the following items: Cable Clamp Kit: includes: 42A19376 CLAMP, cable: 4 req'd 3S7467 SCREW, tapping: #8 x 3/8" plain hex; 4 req'd
	1V849628	Mounting Hardware Kit: includes: 3S125947 SCREW, tapping: #14 x 3/4" plain hex; 4 req'd 4S119331 LOCKWASHER: 1/4" split; 4 required
	1V84019	Noise Filter Kit: includes: 8A821889 CAPACITOR, generator hash filter: fixed: paper; tubular; .5 uf ±20%; 150 vdcw; one lead grounded; one lead insulated; 2 supplied 6A4141 SUPPRESSOR, noise: resistor, screw type 4S7670 LOCKWASHER: 1/4" internal; 2 required
	Cable Kits	
		TK190 Cable Kit (6 volt installations) includes reference parts F1, W1, W2, XF1, and the following items:
	1V847705	Mounting Hardware Kit, fuseholder: includes:
	4A83863	WASHER, cushion: 2 required
	32A83862	GASKET: 1 required
	3S40065	SCREW, tapping: #10 x 3/4"; slotted round head; 2 req'd
	4S7658	LOCKWASHER: #10 int.; 2 req'd
	4S1706	WASHER, flat: 2 req'd
		TK191 Cable Kit (12 volt installations) includes reference parts F1, W1, W2, XF1 and the following items:
	1V474596	Mounting Hardware Kit, fuseholder includes:
	4A86863	WASHER, cushion: 2 required
	3S400465	SCREW, tapping: #10 x 3/4"; slotted round head; 2 required
	4S7658	LOCKWASHER: #10 int.; 2 req'd
	4S1706	WASHER, flat: 2 req'd
	TK163 Sub-Panel Kit	
		includes reference part W4 and the following items:
	64C802703	TIE PLATE, rear
	64C802701	TIE PLATE, front
	41A840794	SPRING, cushion (affixes to rear tie plate)



NOTES:
1. GROUND FOR 6V OPERATION, +6V FOR 12 V OPERATION.
2. +6V OR +12V DEPENDING ON PRIMARY POWER.
3. +6V WITH 6 OR 12 V PRIMARY POWER.
4. RED-GRN LEAD (DOUBLER DRIVER PLATE) USED WITH 144-174 MC. EQUIPMENT ONLY.

Front Mount Radio Sets
With D-C Type Volume Control
Intercabling Diagram
Motorola No. 63E862103-A
1/15/60-CP



Rear Mount Radio Sets
Intercabling Diagram
Motorola No. 63E839323-G
1/15/60-CP

PARTS LIST for Intercabling Diagram 63E862103-A

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		LAMP, incandescent:
DS1	65R4151	6-7 volt; .2 ampere; single contact bayonet base; globular glass; type 51
DS2		same as DS1
		FUSE, cartridge: one time;
F1	65K830314 (6 volt)	paper; 40 ampere; 250 volt; 3" long x 13/16" dia.
	or 65K52482 (12 volt)	paper; 20 ampere; 250 volt; 2" long x 9/16" dia.
		CONNECTOR, receptacle:
J1	9B16345	female; 4 contact; polarized; round molded phenolic insulator chassis mounted
J2	9A85615	female; single contact; round molded mica filled bakelite insulator; chassis mounted; does not include 15A483599 SHELL, connector; shell must be ordered separately
J3	28B834755	male; 6 contact; polarized; rectangular molded black phenolic insulator; saddle mounted
		SPEAKER, magnetic:
LS1	50C800112	P.M.; voice coil; 3.2 ohm; 1.5 watt; 4-3/4" diameter
		CONNECTOR, plug:
P1	9B834756	female; 6 contact; polarized; rectangular; includes shell
P2	28A474006	male; coaxial; phono type
P3		same as P2
P4		same as P2
		RESISTOR, fixed: composition; ±10%; unless otherwise stated
R1	18A822378	500K; 2.25 w max.
R2		NOT USED
R3	18D890193	variable: wire-wound; 10K; 2 w
R4		NOT USED
R5		NOT USED
R6		NOT USED
R7		NOT USED
R8		NOT USED
R9	17B834758	wire-wound: .03 ohm; 30 w
		SWITCH,
S1	40B834757	toggle: 3pst
S2	40A80248	toggle: spdt
	or 40K811824	toggle: spdt
S3		NOT USED
S4	40C857174	push: dpst; does not include push button
		CABLE ASSEMBLY, power:
W1	1V835443 (6 volt)	includes: 30A16396 CABLE, power single conductor; #8 ga.; stranded; rubber ins.; black cotton outer wrap; 24" length required 29K847817 LUG, ring tongue: for 3/8" stud 29K835302 LUG, ring tongue: for 1/4" stud
	or 1V835445 (12 volt)	includes: 30A16396 CABLE, power: single conductor; #8 ga.; stranded; rubber ins.; black cotton outer wrap; 24" length required 29K847817 LUG, ring tongue: for 3/8" stud 29K824434 LUG, ring tongue: for #10 stud
		CABLE ASSEMBLY, special purpose:
W2	1V835442 (6 volt)	includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 LUG, ring tongue: for 5/16" stud 29K835302 LUG, ring tongue: for 1/4" stud Reference part P1
	or 1V835444 (12 volt)	includes: 30A16396 CABLE, power: single conductor; rubber covered; #8 ga. stranded; one 6-1/2' and one 8' length required 29K824454 LUG, ring tongue: for 5/16" stud 29K824434 LUG, ring tongue: for #10 stud Reference part P1
		LINE, RF transmission:
W3	1V836807	assembly; includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 7-1/2" length required Reference parts J2, P2
W4	1K800193	includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 22" length req'd Reference parts P3, P4
		NON-REFERENCED ITEMS The following are replaceable parts which do not appear on the intercabling diagram.
		LIGHT, indicator:
XDS1	60A848400	single contact bayonet base; RED lens
XDS2	60K848401	single contact bayonet base; GREEN lens
		FUSEHOLDER:
XF1	67B83859 (6 volt)	single fuse mounting; rectangular ceramic base; chassis mounted; for 3" long x 13/16" dia. fuse; does not include 64A83861 PLATE, contact; 2 required; plates must be ordered separately
	or 67K892616 (12 volt)	single fuse mounting; rectangular porcelain base; chassis mounted for 2" long x 9/16" dia. fuse; does not include 32A880952 GASKET: gasket must be ordered separately
		NON-REFERENCED ITEMS (cont'd)
		TLN6000A Installation Kit
	1V859627	includes the following items: Cable Clamp Kit: includes: 42A19376 CLAMP, cable: 4 req'd 3S7467 SCREW, tapping: #8 x 3/8" plain hex; 4 req'd
	1V849628	Mounting Hardware Kit: includes: 3S125947 SCREW, tapping: #14 x 3/4" plain hex; 4 req'd 4S119331 LOCKWASHER: 1/4" split; 4 required
	1V84019	Noise Filter Kit: includes: 8A821889 CAPACITOR, generator hash filter: fixed: paper; tubular; .5 uf ±20%; 150 vdcw; one lead grounded; one lead insulated; 2 supplied 6A4141 SUPPRESSOR, noise: resistor, screw type 4S7670 LOCKWASHER: 1/4" internal; 2 required
		Cable Kits
		TK190 Cable Kit (6 volt installations) includes reference parts F1, W1, W2, XF1, and the following items:
	1V847705	Mounting Hardware Kit, fuseholder: includes:
	4A83863	WASHER, cushion: 2 required
	32A83862	GASKET: 1 required
	3S40065	SCREW, tapping: #10 x 3/4"; slotted round head; 2 req'd
	4S7658	LOCKWASHER: #10 int.; 2 req'd
	4S1706	WASHER, flat: 2 req'd
		TK191 Cable Kit (12 volt installations) includes reference parts F1, W1, W2, XF1 and the following items:
	1V474596	Mounting Hardware Kit, fuseholder includes:
	4A86863	WASHER, cushion: 2 required
	3S400465	SCREW, tapping: #10 x 3/4"; slotted round head; 2 required
	4S7658	LOCKWASHER: #10 int.; 2 req'd
	4S1706	WASHER, flat: 2 req'd
		TK163 Sub-Panel Kit
		includes reference part W4 and the following items:
	64C802703	TIE PLATE, rear
	64C802701	TIE PLATE, front
	41A840794	SPRING, cushion (affixes to rear tie plate)
		TU206 Control Panel
		includes reference parts DS1, DS2, J1, J2, J3, LS1, R1, R3, R9, S1, S2, and the following items:
	10A893869	WIRE, cover hinge; 2 required
	55A893871	LOCK, key: includes 55K893872 KEY, 2 keys supplied
	55A893873	HANDLE
	64K858229	SCREEN, speaker
	35B834775	CLOTH, speaker grille
	36B844653	KNOB, control: 2 required
	38A801777	BUTTON, plug: 7/16"
	38K890353	BUTTON, plug: 1/2"

"A" RELAY NOTES

If the cable kit is supplied with a 6 volt "A" relay, it can be used in a vehicle with either a 6 volt or a 12 volt battery.

6 VOLT "A" RELAY AND 6 VOLT BATTERY

1. Use the relay as shipped.
2. Ignition switch control:
    1. Remove R10 and W6 from "H".
    2. Connect W7 from "S" to the ignition "accessory" tap.

6 VOLT "A" RELAY AND 12 VOLT BATTERY

1. Remove R10.
2. Ignition switch control:
    1. Remove R10 and W6 from "H". Remove W6 and "S" and discard.
    2. Connect one end of W7 to the loose end of R10 and insulate. Connect the other end to the ignition "accessory" tap.

If the cable kit is supplied with a 12 volt "A" relay, it can only be used in a vehicle with a 12 volt battery.

12 VOLT "A" RELAY AND 12 VOLT BATTERY

1. Use the relay as shipped.
2. Ignition switch control:
    1. Remove W6.
    2. Connect W7 from "S" to the ignition "accessory" tap.

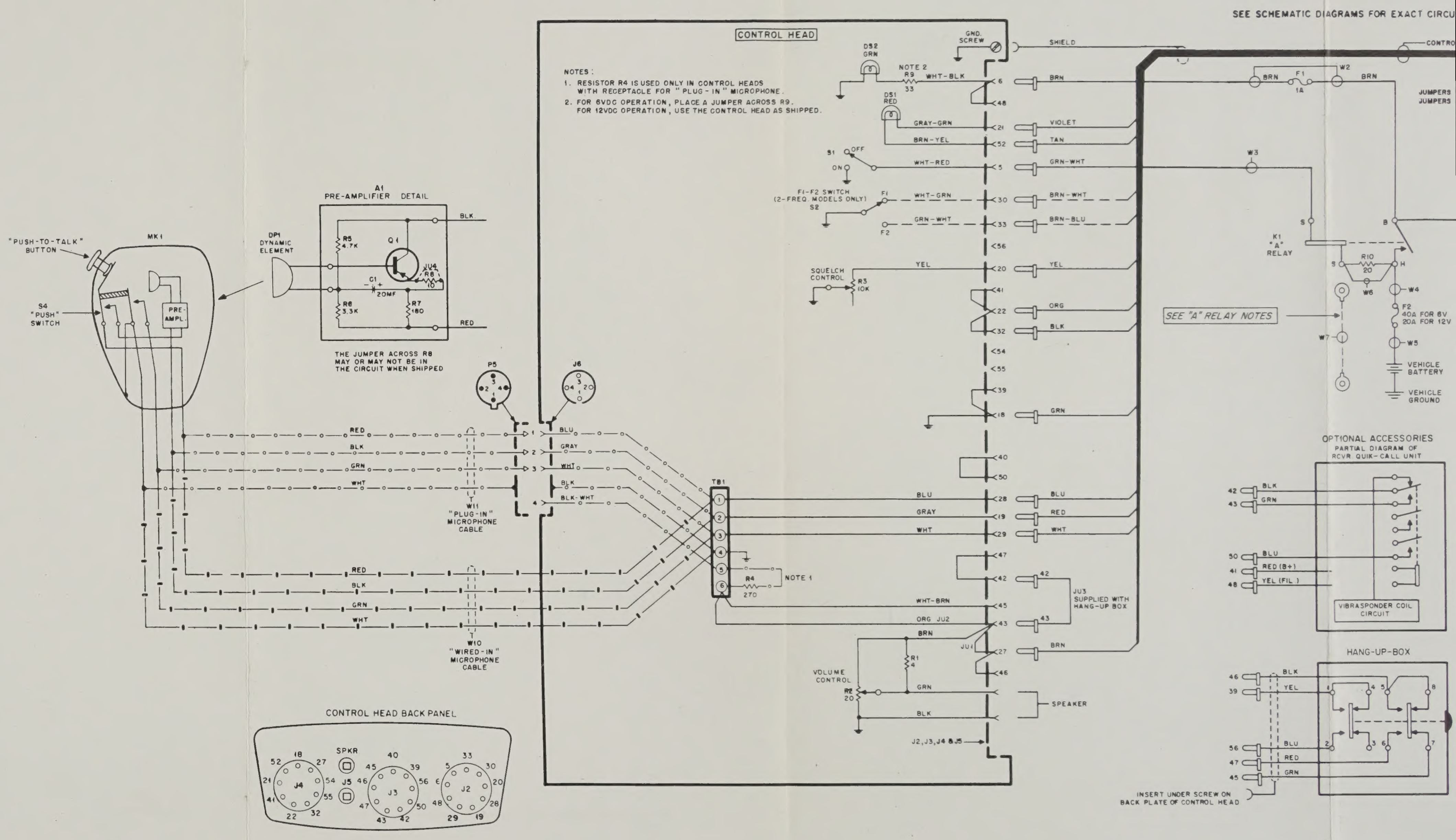
EPD-1892-O

CONTROL HEAD JUMPER TABLE

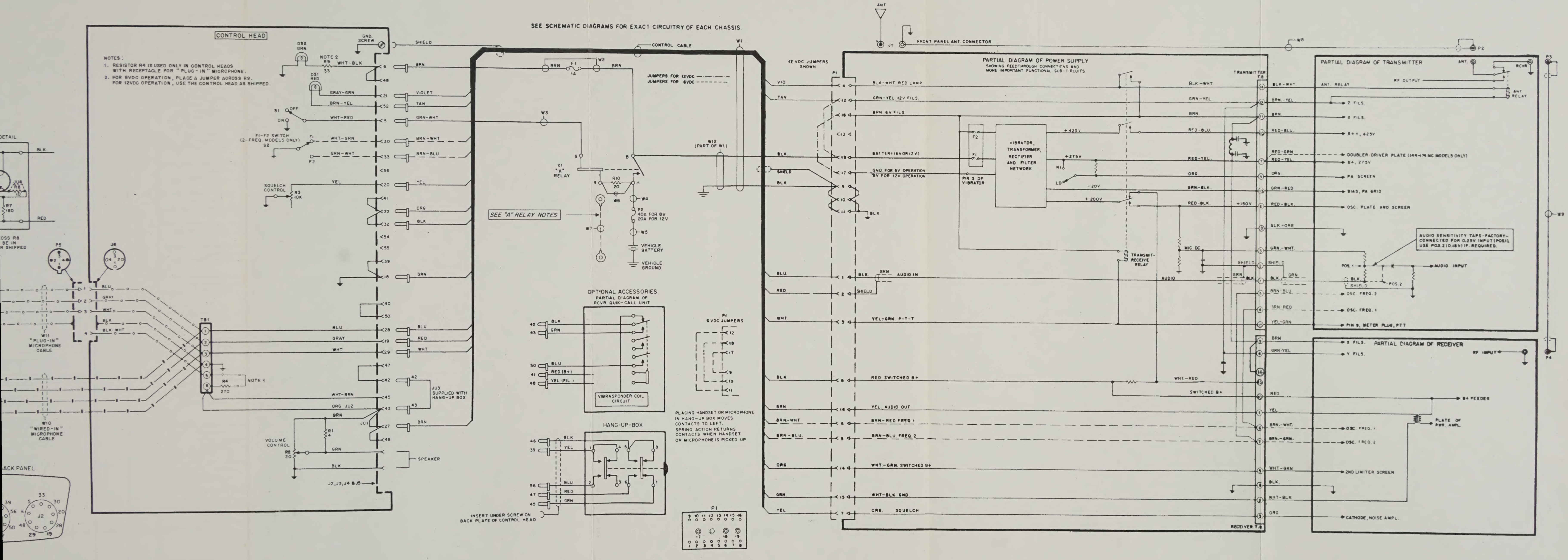
CASE NO.	EQUIPMENT USED*				CIRCUIT OPERATION	JUMPERS		
	MIC.	HANDSET	HANG-UP BOX	QUIK-CALL		JU1	JU2	JU3
1	EITHER		---	---	Basic operation. Radio Set Speaker in circuit at all times	USED	USED	OMIT
2	---	X	X	---	Handset picked up connects audio to handset earpiece	OMIT	OMIT	USED
					Handset picked up connects audio to handset earpiece, speaker in circuit.	USED	OMIT	USED
3	X	---	X	X	Audio to speaker when microphone is removed or hung up. Alarm circuit energized. "Quik-call" disabled.	OMIT	USED	OMIT
4	---	X	X	X	Audio switched from speaker to handset earpiece. Alarm circuit energized	OMIT	OMIT	OMIT
					Audio switched from "quik-call" to speaker and handset. Alarm circuit energized.	OMIT	USED	OMIT
5	EITHER		---	X	"Quik-call" used for alarm purposes only. Audio to speaker at all times.	USED	USED	OMIT

* X = item used
--- = item not used

EPD-1516-O



NOTES:
1. RESISTOR R4 IS USED ONLY IN CONTROL HEADS WITH RECEPTACLE FOR "PLUG-IN" MICROPHONE.
2. FOR 6VDC OPERATION, PLACE A JUMPER ACROSS R9. FOR 12VDC OPERATION, USE THE CONTROL HEAD AS SHIPPED.

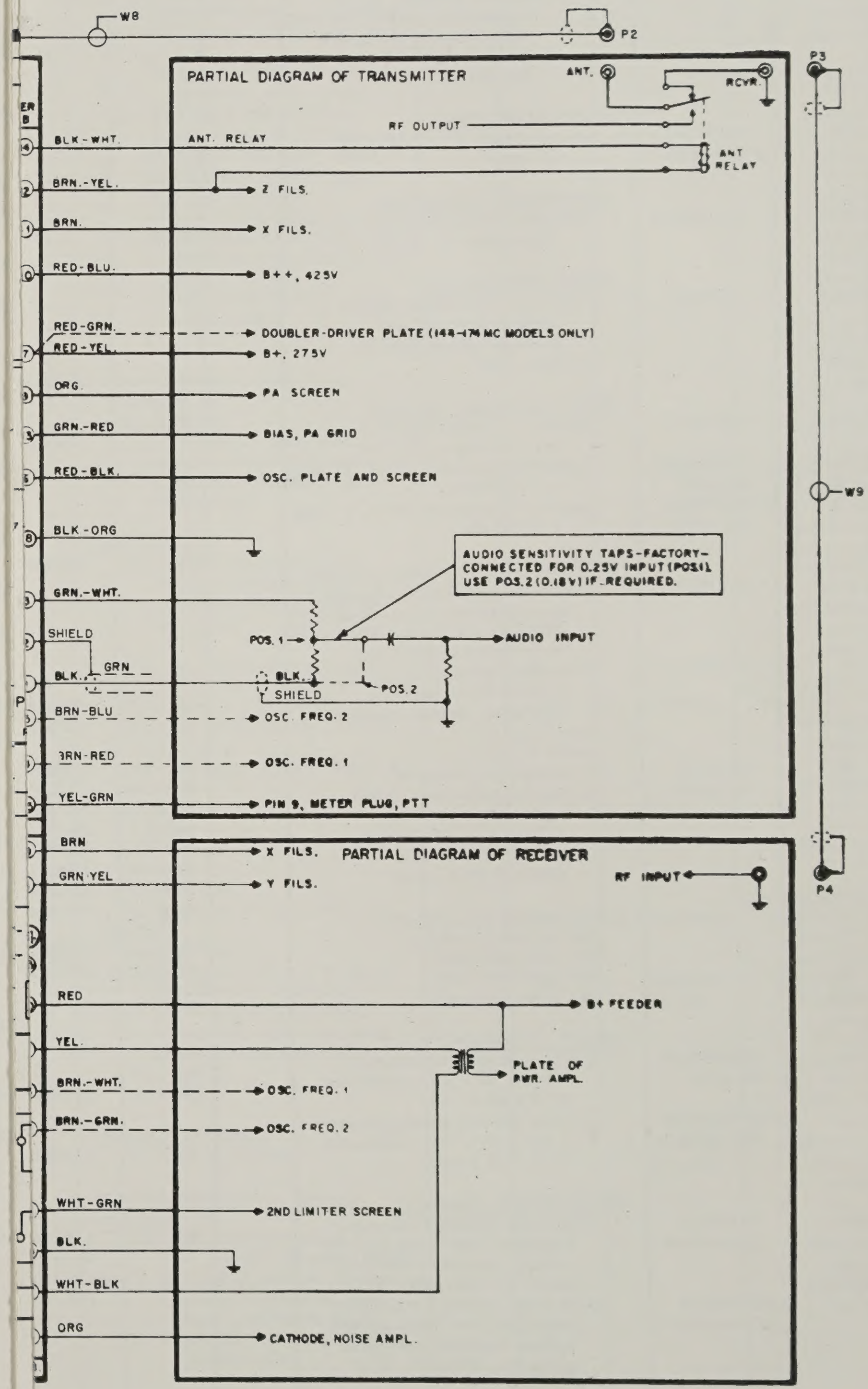

SEE SCHEMATIC DIAGRAMS FOR EXACT CIRCUITRY OF EACH CHASSIS.

NOTES:
1. RESISTOR R4 IS USED ONLY IN CONTROL HEADS WITH RECEPTACLE FOR "PLUG-IN" MICROPHONE.
2. FOR 6VDC OPERATION, PLACE A JUMPER ACROSS R9. FOR 12VDC OPERATION, USE THE CONTROL HEAD AS SHIPPED.

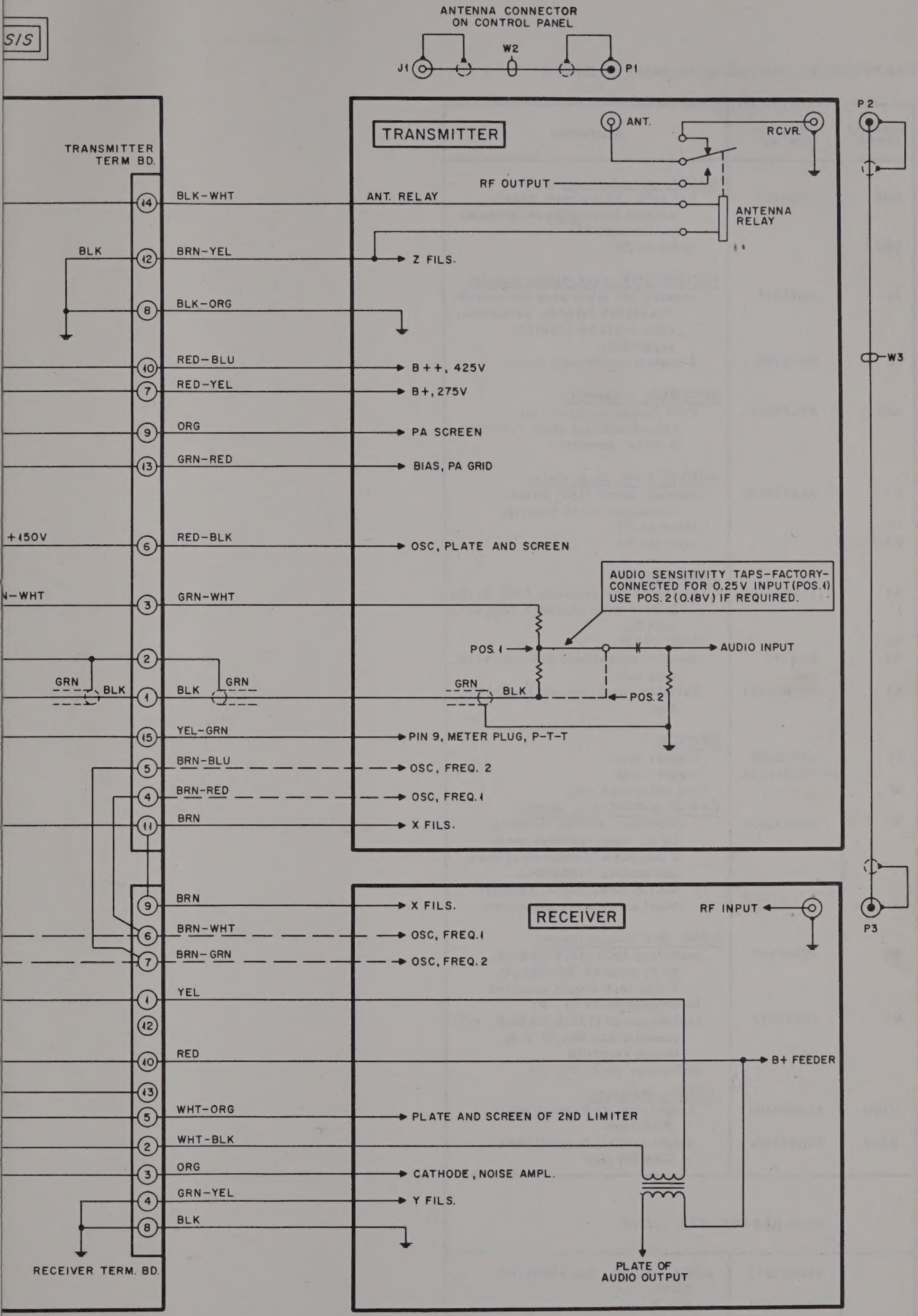
PLACING HANDSET OR MICROPHONE IN HANG-UP BOX MOVES CONTACTS TO LEFT. SPRING ACTION RETURNS CONTACTS WHEN HANDSET OR MICROPHONE IS PICKED UP.

AUDIO SENSITIVITY TAPS-FACTORY-CONNECTED FOR 0.25V INPUT (POS.1) USE POS.2 (0.18V) IF REQUIRED.

Rear Mount Radio Sets
Intercabling Diagram
Motorola No. 63E839323-G
1/15/60-CP



Rear Mount Radio Sets
Intercabling Diagram
Motorola No. 63E839323-G
1/15/60-CP



A-C Utility Radio Sets
With D-C Type Volume Control
Intercabling Diagram
Motorola No. 63E835264-C
1/15/60-CP

PARTS LIST for Intercabling Diagram 63E839323-G

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		AMPLIFIER, AF:
A1	1V861317	microphone pre-amplifier: assembly; includes: 1V859594 BOARD, circuit: eyeleted assembly; includes soldering lug terminals Reference parts C1, Q1, R5, R6, R7, R8
		CAPACITOR, fixed:
C1	23C855013 or 23B844927	electrolytic; 20 uf +100-10%; 25 vdcw
		CARTRIDGE, microphone:
DP1	59C852603	magnetic; dynamic type; 175 ohm impedance at 1 kc
		LAMP, incandescent:
DS1	65R4151	6-8 volt; .2 ampere; single contact bayonet base; globular glass; type 51
DS2		same as DS1
		FUSE, cartridge: one time;
F1	65R52281	glass; 1 ampere; 250 V; 1-1/4" long x 1/4" dia.
F2	65K830314 (6 volt)	paper; 40 ampere; 250 V; 3" long x 13/16" dia.
	or 65K52482 (12 volt)	paper; 20 ampere; 250 V; 2" long x 9/16" dia.
		CONNECTOR, receptacle: female;
J1	9A85615	coax.; uhf type; square mounting base; does not include 15A483599 SHELL, connector: shell must be ordered separately;
J2	9B855150	9 contact; polarized; round molded black phenolic insulator; saddle mounted
J3		same as J2
J4		same as J2
J5	9K82810	2 contact; rectangular
J6	9B16345	4 contact; polarized; round; includes: 4S7699 LOCKWASHER: 13/16" internal 2K81180 NUT, ring
		LEAD, electrical: jumper;
JU1		for reference only
JU2		for reference only
JU3		for reference only
JU4		for reference only
		RELAY, armature:
K1	59K858479 (6 volt)	6 v dc; contact arrangement, 1 form "A"; coil resistance 19.8 - 24.2 ohm
	or 59K858480 (12 volt)	12 v dc; contact arrangement, 1 form "A"; coil resistance 76.5 - 93.5 ohm
		MICROPHONE, dynamic:
MK1	1V854033 ("plug-in")	palm type; contains transistor amplifier and "push-to-talk" switch; includes reference parts A1, DP1, S4, W11
	or 1V852400 ("wired-in")	palm type; contains transistor amplifier and "push-to-talk" switch; includes reference parts A1, DP1, S4, W10

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CONNECTOR, plug:
P1	9C801050	female; 19 contact; polarized; rectangular; does not include the following component parts which must be ordered separately: 15B800676 SHELL, connector 15B800674 COVER, connector shell 14A800673 INSULATOR, connector shell: small 14B800678 INSULATOR, connector shell: large 42A800667 CLAMP, cable 42A800669 CLAMP, cable 4A11722 WASHER, "C" 4A800671 WASHER 3B800681 SCREW, connector retaining: includes knurled knob 3S7209 SCREW, 6-32 x 1/8; 2 required
P2	28A474006	male; coaxial; phono type
P3		same as P2
P4		same as P2
P5	28A16370	male; 4 contact; polarized; includes metal shell and 41K838823 SPRING, cable strain relief
		TRANSISTOR:
Q1	48A124317	type MN60; does not include 14A861196 INSULATOR: insulator must be ordered separately
		RESISTOR, fixed: carbon; ±10%; 1/2 w; ins.; unless otherwise stated
R1	17K892469	wire-wound; 4 ohm ±2%; 1 w
R2	18K855108	variable: wire-wound; 20 ohm ±20%; 2 w
R3	18K855107	variable: wire-wound; 10K; 2 w
R4	6R6336	270 ohm; 1 w
R5	6R6080	4.7K
R6	6R5581	3.3K
R7	6R5660	180 ohm
R8	6R5621	10 ohm
R9	6R488016	33 ohm; 2 w
R10	17K85493	wire-wound; 20 ohm ±5%; 5 w
		SWITCH,
S1	40B858304	toggle: spst
S2	40A80248	toggle: spdt; does not include 2S8382 NUT, machine: 15/32 - 32 x 9/16" hex; 2 required; nuts must be ordered separately
S3		NOT USED
S4	40B857174	push: dpst
		BOARD, terminal:
TB1	31A890699	6 screw terminals
		CABLE ASSEMBLY, special purpose:
W1	1V831617 (6 volt) or 1V832061 (12 volt)	includes reference parts P1, W12, and the following items: 30C830032 CABLE: 12 conductor; stranded, ins.; leads; shielded; black plastic covered; 17 ft. length req'd

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CABLE ASSEMBLY, (cont'd) 29K890418 CONNECTOR, plug; male; single contact; pin type cable mounted; coded #18 also includes the following connectors which are the same as above part number 29K890418 except for coding as indicated Part No. — Code # 29K890419 — 19 29K890420 — 20 29K890421 — 21 29K890422 — 22 29K890427 — 27 29K890428 — 28 29K890429 — 29 29K890430 — 30 29K890432 — 32 29K890433 — 33 29K835340 — 52 also includes: 42A893468 CLAMP, cable: "wrap around"; strain relief 42A893464 HOOK, "S"; strain relief 29A824151 LUG, slotted tongue: for #10 stud and #10 wire
W2	1V859441	assembly; consisting of "in line" fuseholder with attached connecting leads: includes reference part XF1 and the following items: 29K824456 LUG, ring tongue: for #10 stud and #18 wire 29K890406 CONNECTOR, plug: male; single contact; pin type; coded #6
		LEAD, electrical:
W3	1V859428	includes: 10M488285 WIRE, electrical: #20 ga.; str.; ins.; coded GRN-WHT; 68" length req'd 29K890405 CONNECTOR, plug: male; single contact; pin type cable mounted; coded #5 29K824456 LUG, ring tongue: for #10 stud and #20 wire
		CABLE ASSEMBLY, power:
W4	42A858471	consists of a brass strap 2-3/4" long x 5/8" wide x .015" thick; processed and plated
W5	1V859443 (6 volt)	includes: 30B81067 CABLE, power: single conductor; #4 ga.; stra.; ins. coded RED; 5 ft. length req'd 29K830071 LUG, ring tongue for #10 stud 29K847815 LUG, ring tongue for 3/8" stud
	or 1V859446 (12 volt)	includes: 30K813233 CABLE, power: single conductor; #10 ga. str. ins. coded RED; 5 ft. length required 29K830073 LUG, ring tongue for 5/16" stud 29K824154 LUG, ring tongue for #10 stud

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		LEAD, electrical:
W6	1V859442	includes: 10M370 WIRE, electrical: single conductor; #12 ga.; stranded; ins.; coded BLACK, 4" length req'd . 29K845081 LUG, slotted tongue for #8 stud; 2 req'd
W7	1V847414	includes: 10M430 WIRE, electrical: single conductor; #20 ga.; str.; ins.; coded BLACK; 5 ft. length required 29K824456 LUG, ring tongue: for #10 stud; 2 req'd
		LINE, RF, transmission:
W8	1V813547	coaxial; includes: 30B475378 CABLE, RF: coaxial, RG-58A/U; 5-1/2" length required; reference parts J1 and P2
W9	1K800193	coaxial; includes: 30B475378 CABLE, RF: coaxial, RG-58A/U; 2 ft. length required; reference parts P3 and P4
		CORD, microphone:
W10	1V854006 ("wired-in" mic.)	includes: 30K852742 CORD, coiled; tinsel, 4 conductor 41A852707 SPRING, strain relief 11M2506 TUBING, extruded, #9 BLK; 1" length req'd 29A847033 LUG, terminal; wire mounted; insulation piercing; 8 req'd
W11	1V854034 ("plug-in" mic.)	includes: 30K852742 CORD, coiled; tinsel; 4 conductor 41A852707 SPRING, strain relief 11M9578 TUBING, extruded; #8 CLEAR, 2" length req'd 29A847033 LUG, terminal; wire mounted, insulation piercing; 4 req'd 29A847034 LUG, terminal; wire mounted, insulation piercing; 4 req'd 37K480513 SLEEVE, rubber Reference part P5
W12	1V831618 (6 volt)	includes: 30K825602 CABLE, power: single conductor; #6 ga; stranded; ins.; coded BLK; one 17 ft. and one 4 ft. length required 29K830074 LUG, ring tongue: for 5/16" stud 29A831578 LUG, ring tongue: for #10 stud
	or 1V832062 (12 volt)	includes: 30K831572 CABLE, power: single conductor; #10 ga.; stranded; ins.; coded BLK; one 17 ft. and one 4 ft. length req'd 29K824154 LUG, ring tongue: for #10 stud 29K830073 LUG, ring tongue: for 5/16" stud

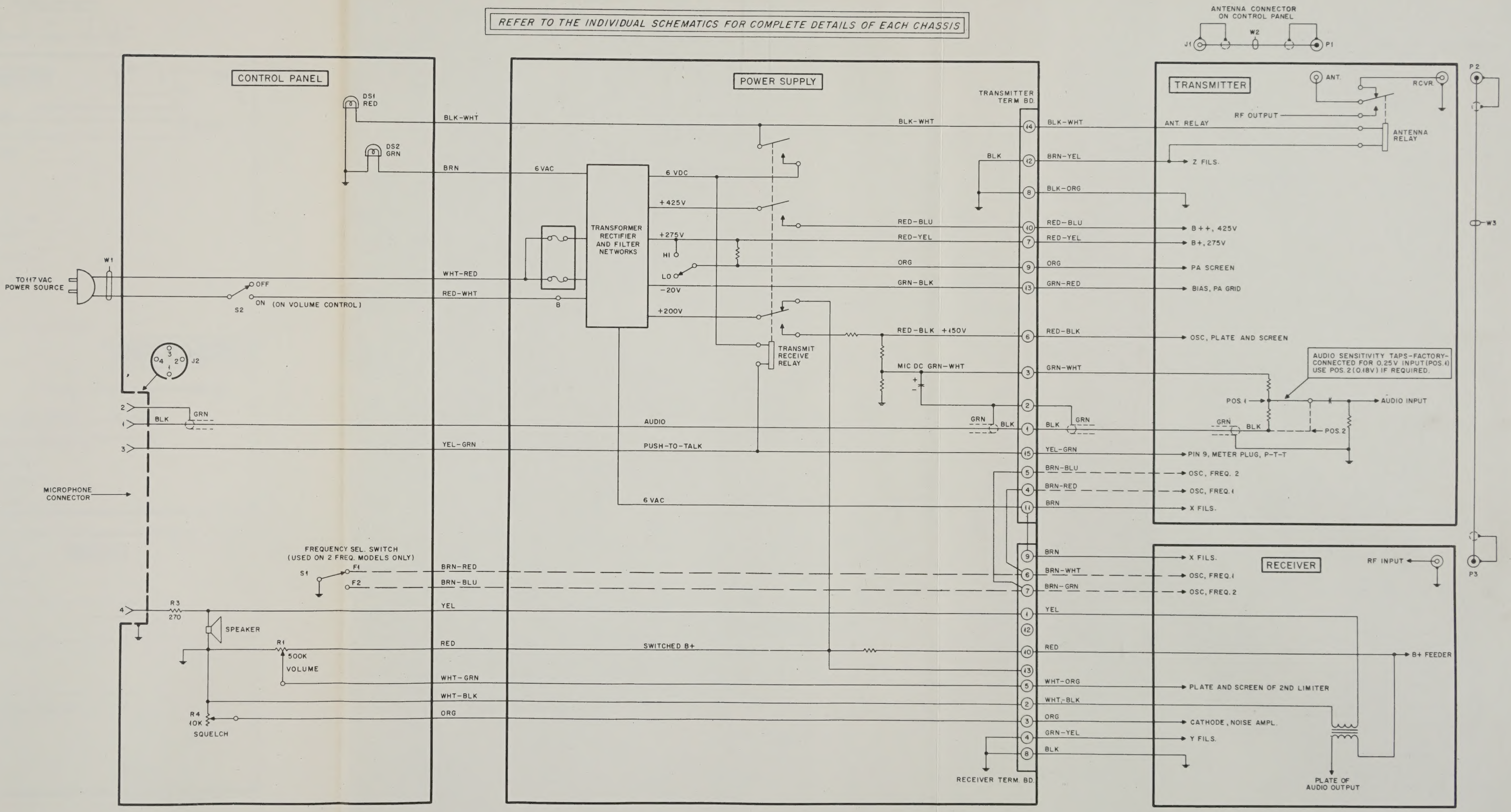
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	NON-REFERENCED ITEMS (cont'd)	
	Control Heads (cont'd)	
	1V859999	MOUNTING HARDWARE KIT: includes: 4K847649 WASHER, fiber: 2 req'd 4S7670 LOCKWASHER: 1/4" internal; 2 required 3S129304 SCREW, machine: 1/4 - 20 x 1/2" slotted oven head; 2 required
	Control head models are listed below. Each model includes the items shown for the model, plus items listed above.	
		TCN6001AA Control Head
		(1-freq. with "wired-in" microphone): includes the following items:
	1V852400	MICROPHONE (reference part MK1)
	38A857093	BUTTON, plug
	37K106352	GROMMET, rubber; for 7/16" diameter hole
	1V16241	MOUNTING KIT, microphone: includes: 64A85596 BRACKET, microphone hang-up 3S122830 SCREW, tapping: #8 x 1/2" slotted binder head; 2 required
		TCN6001AB Control Head
		(2 freq. with "wired-in" microphone): includes reference part S2 and the following items:
	1V852400	MICROPHONE (reference part MK1)
	38A857093	BUTTON, plug
	37K106352	GROMMET, rubber; for 7/16" diameter hole
	1V16241	MOUNTING KIT, microphone: includes: 64A85596 BRACKET, microphone hang-up 3S122830 SCREW, tapping #8 x 1/2" slotted binder head; 2 required
		TCN6001AE Control Head
		(1-freq. with receptacle for "plug-in" microphone): includes reference parts J6, R4 and the following items:
	4S7691	LOCKWASHER: 3/8" internal
	29R5279	LUG, soldering: 7/8"
		TCN6001AF Control Head
		(2-freq. with receptacle for "plug-in" microphone): includes reference parts J6, R4, S2 and the following items:
	4S7691	LOCKWASHER: 3/8" internal
	29R5279	LUG, soldering: 7/8"

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	NON-REFERENCED ITEMS The following are replaceable parts which do not appear on the intercabling diagram.	
		LAMPHOLDER:
XDS1	9A855117	single contact miniature bayonet base
XDS2		same as XDS1
		FUSEHOLDER:
XF1	9K847158	cable mounted; male and female retainer; single fuse mounting; includes #18 ga. wire leads, stranded, insulated, coded BRN; length 68" overall for 1-1/4" long x 1/4" dia fuse; includes reference part F1
XF2	1V859440 (6 volt)	includes reference parts K1, R10, W4, W5, W6, and the following items. 14B858470 BOARD, mounting; molded phenolic 42A858473 RETAINER, fuse: (top) 42A861382 RETAINER, fuse: (botton, closed end) 15C861390 COVER, mounting board
	or 1V859445 (12 volt)	includes reference parts K1, W4, W5, W6, and the following items: 14B858470 BOARD, mounting; molded phenolic 42A858474 RETAINER, fuse: (top) 42A861384 RETAINER, fuse: (bottom, closed end) 15C861390 COVER, mounting board
	Control Heads Items which are common to all control heads are listed first. Items which are not common to all control heads are listed under the model number of the particular control head concerned.	
		Items common to all control heads include reference parts DS1, DS2, J2, J3, J4, J5, R1, R2, R3, R9, S1, TB1, XDS1, XDS2, plus the following:
	2S8382	NUT, machine: 15/32 - 32 x 9/16 inch; hex; 2 required
	61B859620	LENS, indicator: RED
	61K859621	LENS, indicator: GRN
	4S7691	LOCKWASHER: 3/8" internal
	2S8364	NUT, machine: 3/8 - 32 x 1/2" hex; 2 required
	64A857162	PLATE, connector mounting (back cover)
	3S122518	LOCKSCREW: 4-40 x 3/16" plain hex head; 2 required
	3S124542	LOCKSCREW: 6-32 x 3/4" plain hex head; 4 required
	36B855027	KNOB, control: 2 required
	7B855239	BRACKET, control head mounting

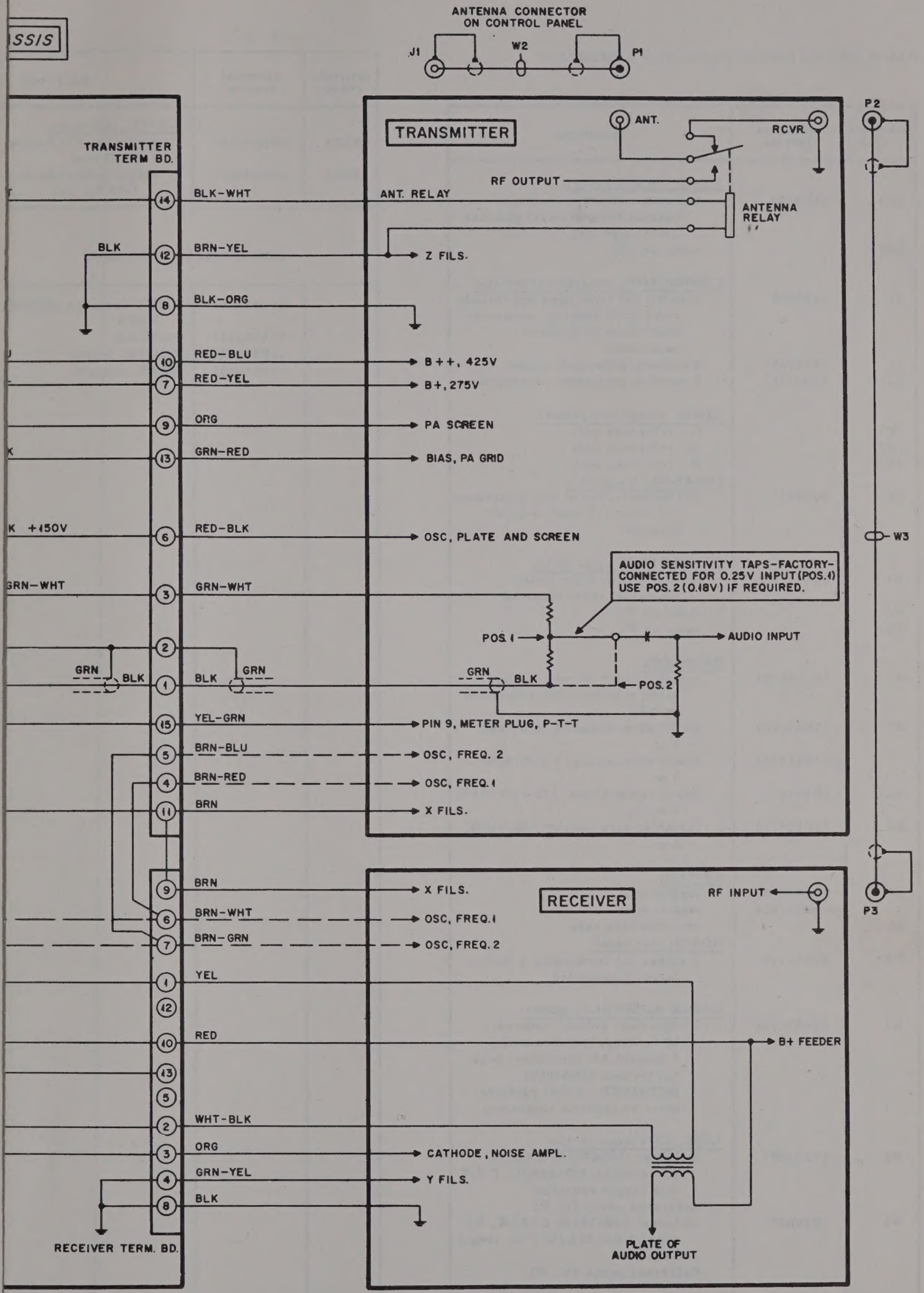
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	NON-REFERENCED ITEMS (cont'd)	
	Microphones Items which are common to all microphones are listed first. Items which are not common to all microphones are listed under the model number of the particular microphone concerned.	
		Items common to all microphones include the following parts: NOTE These items are part of reference part MK1 (both 1V854033 and 1V852400).
	1V854005	BACK HOUSING AND HANG-UP STUD ASSEMBLY
	3S124693	LOCKSCREW: 6-32 x 1/4"; Phillips round head; 3 req'd
	42A852710	STRAP, strain relief
	38A852699	BUTTON, push
	15D852566	FRONT HOUSING
	13B852703	GRILLE
	35A852701	CLOTH, grille
	32B852702	GASKET, rubber
	14A857138	INSULATOR: used for insulating printed circuit assembly
	42A852705	CLAMP, used for securing microphone cartridge
	14A857137	INSULATOR: used between clamp and microphone cartridge
	4K852762	WASHER, insulating; used as a spacer
	3S127924	LOCKSCREW: 6-32 x 5/16"; Phillips round head
	3S127481	SCREW, machine: 6-32 x 7/8"; Phillips round head; 2 req'd
	4S400386	LOCKWASHER: #6 split; 2 req'd
		Microphone models are listed below. Each model includes the items shown for the model, plus items listed above.
		1V852400 Microphone ("wired-in" type) includes reference part MK1 (1V852400)
		TU353A Microphone ("plug-in" type) includes reference part MK1 (1V854033) and the following items:
	1V16241	Mounting Kit, microphone: includes: 64A85596 BRACKET, microphone hang-up 3S122830 SCREW, tapping: #8 x 1/2"; 2 req'd

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
	TLN6000A Installation Kit	
		includes:
	1V859627	Cable Clamp Kit: includes: 42A19376 CLAMP, cable: 4 req'd 3S7467 SCREW, tapping: #8 x 3/8" plain hex; 4 req'd
	1V849628	Mounting Hardware Kit: includes: 3S125947 SCREW, tapping: #14 x 3/4" plain hex; 4 req'd 4S119331 LOCKWASHER: 1/4" split; 4 required
	1V84019	Noise Filter Kit: includes: 8A821889 CAPACITOR, generator hash filter: fixed: paper; tubular; .5 uf ±20%; 150 vdcw; one lead grounded; one lead insulated; 2 supplied 6A4141 SUPPRESSOR, noise: resistor; screw type 4S7670 LOCKWASHER: 1/4" internal; 2 required
	Cable Kits	
		TKN6004A Cable Kit (6 volt installation) includes reference parts F1, F2, K1, R10, W1 to W7, W12, XF1, XF2, and the following items:
	1V859444	Installation Kit: includes: 3S7457 SCREW, tapping: #8 x 7/8" plain hex head; 3 req'd 3S7542 SCREW, tapping: #8 x 3/8" slotted binder head; 4 req'd 42A19376 CLAMP, cable: 4 req'd 37K103890 GROMMET, rubber: for 1-1/16" hole 37K107997 GROMMET, rubber: for 7/8" hole
		TKN6006A Cable Kit (12 volt installation) includes reference parts F1, F2, K1, W1 to W7, W12, XF1, XF2, and the following items:
	1V859447	Installation Kit: includes: 3S8153 SCREW, tapping: #8 x 3/4" plain hex head; 3 req'd 3S7542 SCREW, tapping: #8 x 3/8" slotted binder head; 4 req'd 42A19376 CLAMP, cable: 4 req'd 37K107234 GROMMET, rubber

REFER TO THE INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS



A-C Utility Radio Sets
With D-C Type Volume Control
Intercabling Diagram
Motorola No. 63E835264-C
1/15/60-CP



A-C Utility Radio Sets
With Speaker Pad Type Volume Control
And Provisions for "Quik-Call"
Intercabling Diagram
Motorola No. 63E836072-B
1/15/60-CP

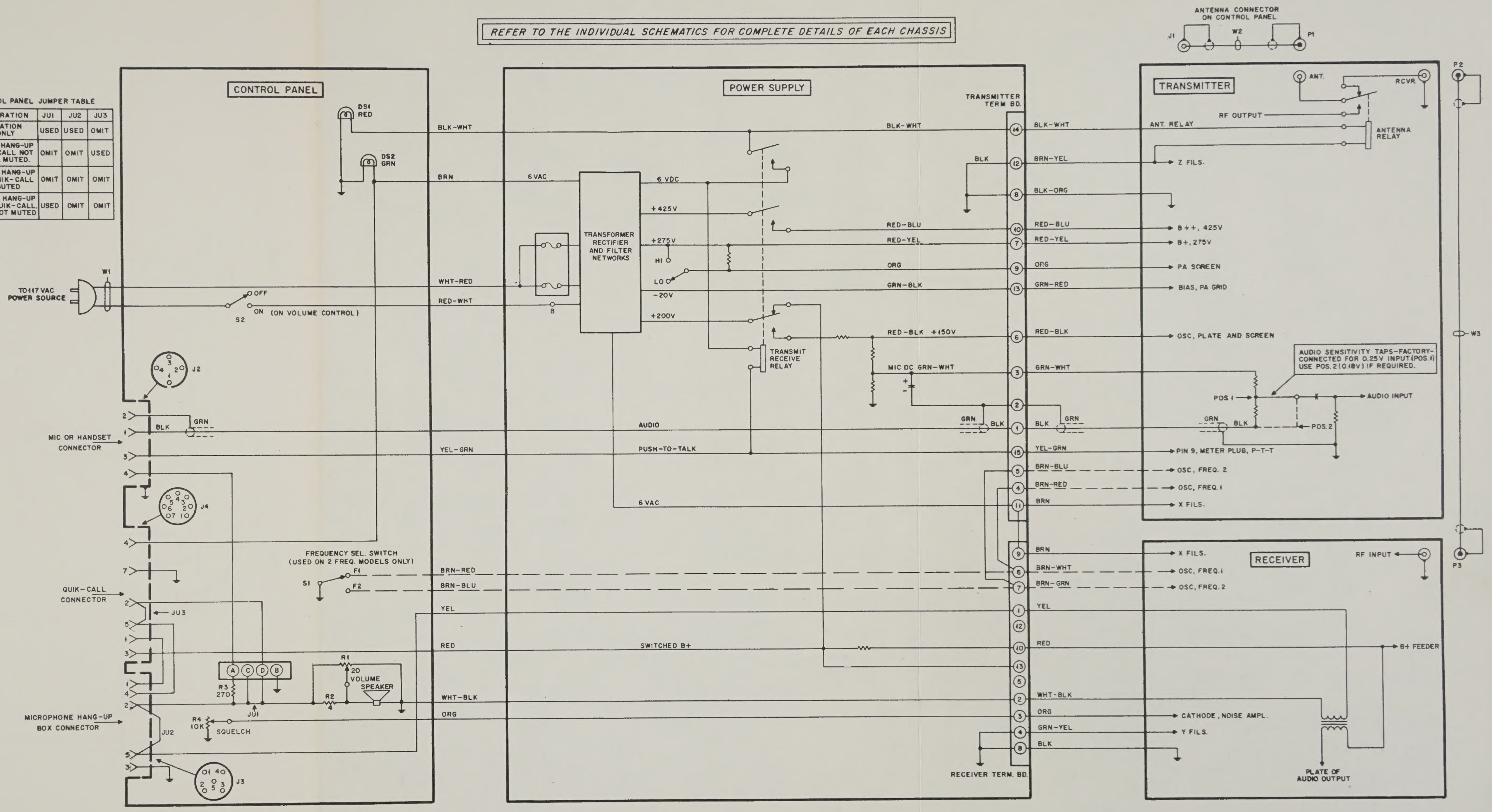
PARTS LIST for Intercabling Diagram 63E835264-C

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		LAMP, incandescent:
DS1	65R4151	6-8 volt; .20 ampere; single contact bayonet base; globular glass; type #51
DS2		same as DS1
		CONNECTOR, receptacle: female;
J1	9A85615	coaxial; uhf type; does not include 15A483599 SHELL, connector; shell must be ordered separately
J2	9B16345	4 contact; polarized; round
		SPEAKER, magnetic:
LS1	50C800112	P-M dynamic; voice coil impedance 3.2 ohm; 1.5 watt; 4-3/32" diameter
		CONNECTOR, plug: male;
P1	28A474006	coaxial; phono type; wafer insulator; cable mounted
P2		same as P1
P3		same as P1
		RESISTOR,
R1	18A822301	variable: composition; 500K ±10%; 2.25 w max; includes reference part S2
R2		NOT USED
R3	6R6336	fixed: composition; 270 ohm ±10%; 1 w; ins.
R4	18D890193	variable: wire-wound; 10K ±10%; 2 w
		SWITCH,
S1	40A80248	toggle: spst
	or 40K811824	toggle: spdt
S2		for reference only
		CABLE ASSEMBLY, power:
W1	30B892534	2 conductor; rubber covered; 10 ft. long; includes male 2 contact a-c connector; does not include 42B850861 RETAINER, cable: retainer must be ordered separately
		LINE, R-F transmission:
W2	1V836807	includes: 30B475378 CABLE, R-F: coaxial; RG-58A/U; 7-1/2 inch length required Reference parts J1, P1
W3	1K800193	includes: 30B475378 CABLE, r-f: coaxial; RG-58A/U; 2 ft. length required Reference parts P2, P3
		LIGHT, indicator:
XDS1	60A848400	single contact bayonet base; RED lens
XDS2	60K848401	single contact bayonet base; GREEN lens
NON-REFERENCED ITEMS		
	55A893871	LOCK: includes two 55K893872 KEYS
	55A893873	HANDLE
	35B834775	CLOTH, grille
	30B844653	KNOB, control

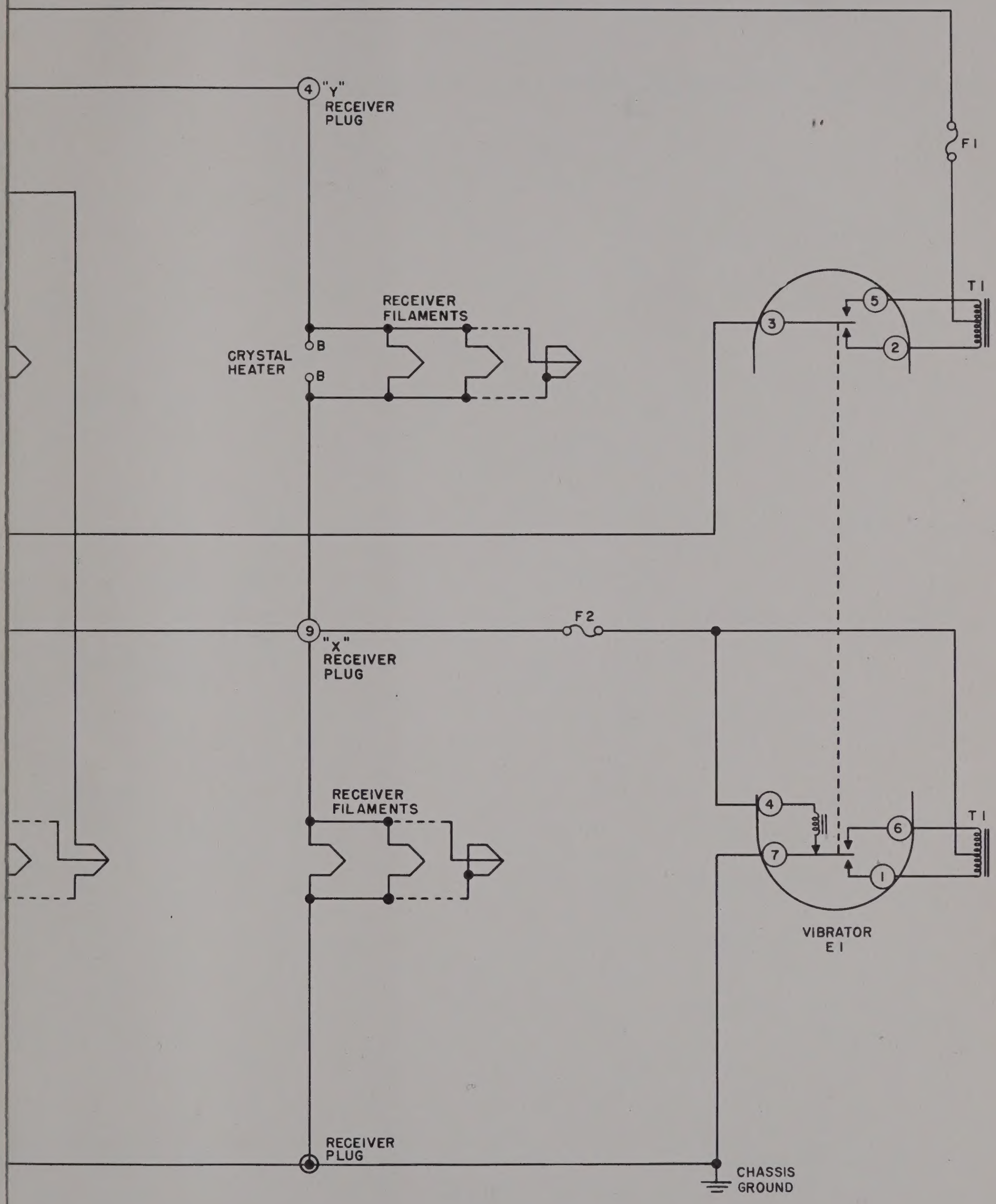
REFER TO THE INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH CHASSIS

CONTROL PANEL JUMPER TABLE

CIRCUIT OPERATION	JU1	JU2	JU3
BASIC OPERATION (HANDSET ONLY	USED	USED	OMIT
HANDSET & HANG-UP BOX (QUIK-CALL NOT USED: SPKR. MUTED.	OMIT	OMIT	USED
HANDSET & HANG-UP BOX AND QUIK-CALL SPEAKER MUTED	OMIT	OMIT	OMIT
HANDSET & HANG-UP BOX AND QUIK-CALL. SPEAKER NOT MUTED	USED	OMIT	OMIT



A-C Utility Radio Sets
With Speaker Pad Type Volume Control
And Provisions for "Quik-Call"
Intercabling Diagram
Motorola No. 63E836072-B
1/15/60-CP

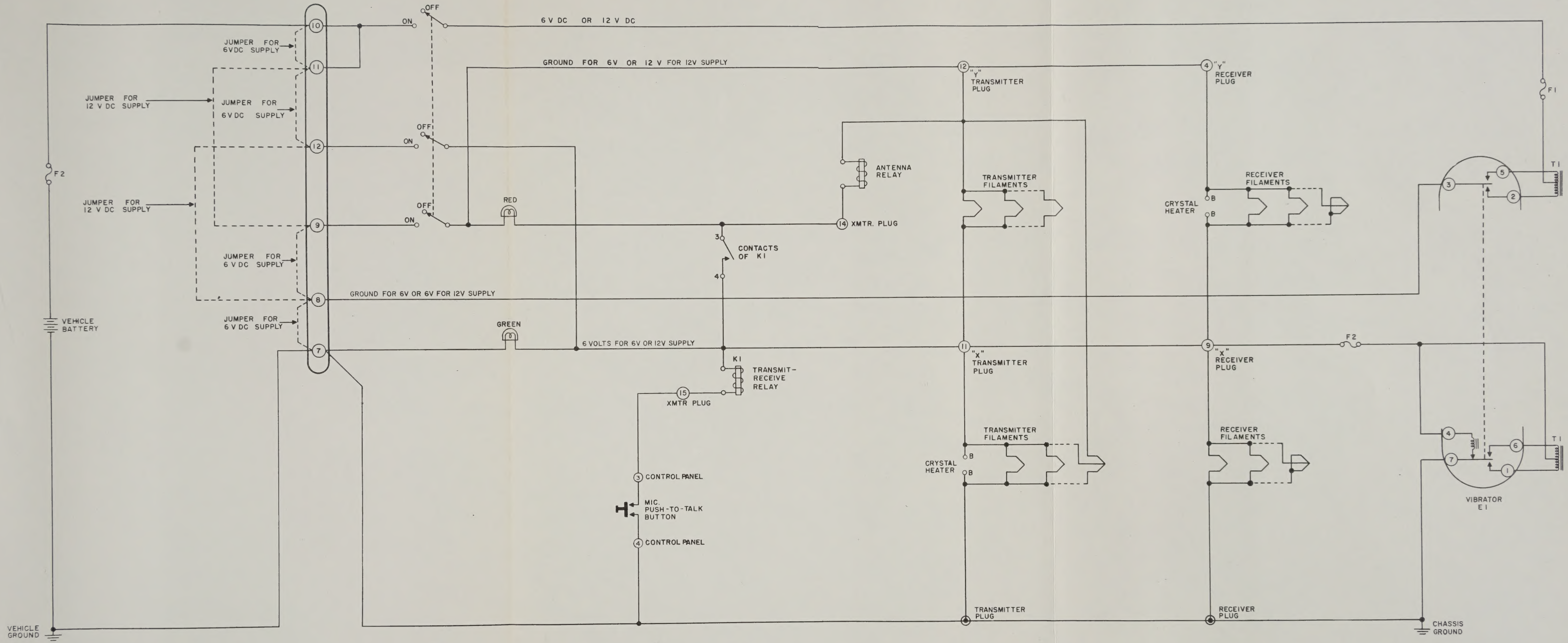


D43GGV Series Radio Sets
Simplified Functional Diagram
Motorola No. 63E854644-A
1/15/60-CP

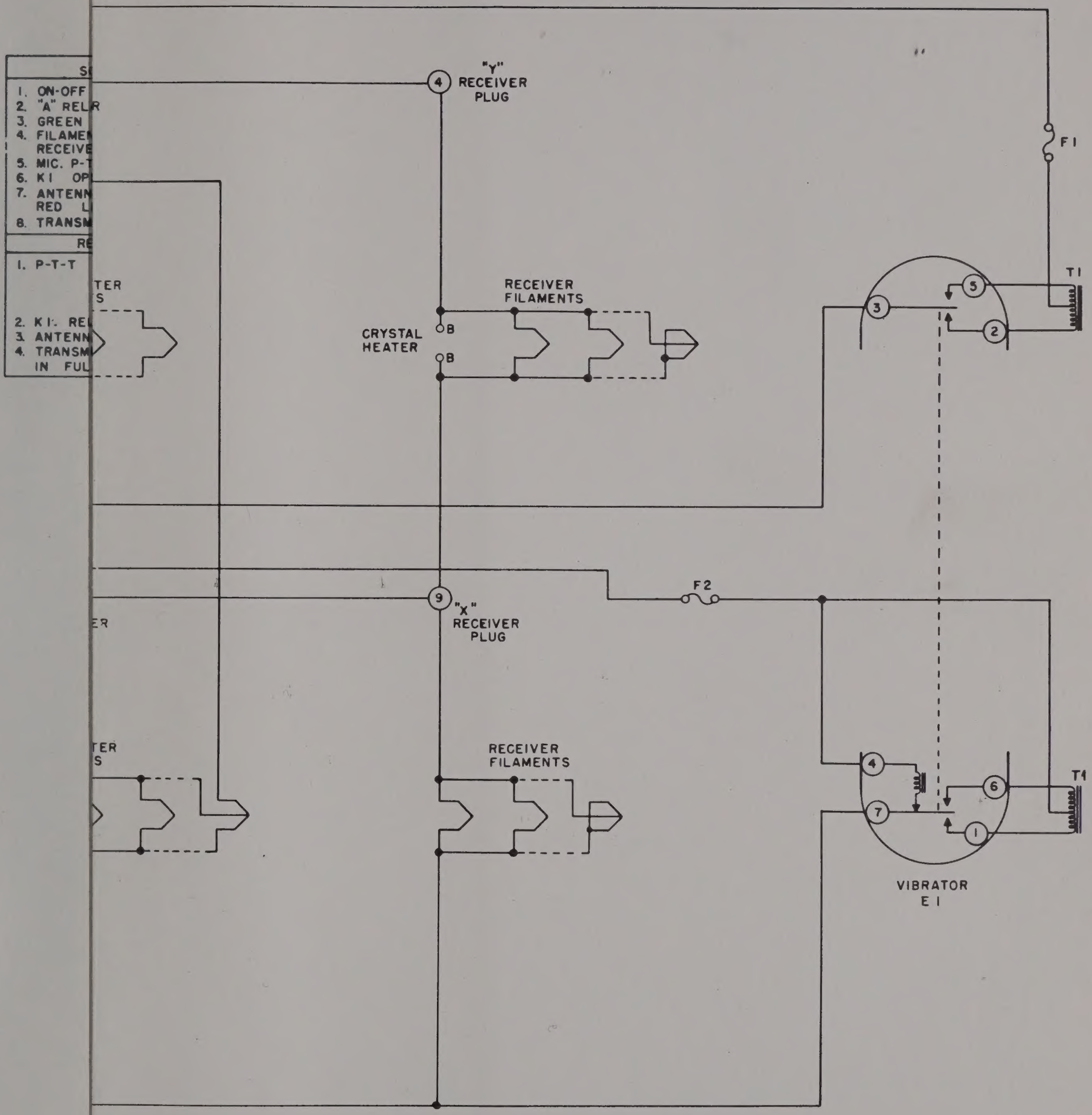
PARTS LIST for Intercabling Diagram 63E836072-B

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		LAMP, incandescent:
DS1	65R4151	6-8 volt; .20 ampere; single contact bayonet base; globular glass; type #51
DS2		same as DS1
		CONNECTOR, receptacle: female;
J1	9A85615	coaxial; uhf type; does not include 15A483599 SHELL, connector; shell must be ordered separately
J2	9B16345	4 contact; polarized; round
J3	9A802761	5 contact; polarized; rectangular
		LEAD, electrical: jumper
JU1		for reference only
JU2		for reference only
JU3		for reference only
		SPEAKER, magnetic:
LS1	50C800112	PM dynamic; voice coil impedance 3.2 ohm; 1.5 watt; 4-3/32" diameter
		CONNECTOR, plug: male;
P1	28A474006	coaxial; phono type; wafer insulator; cable mounted
P2		same as P1
P3		same as P1
		RESISTOR,
R1	18C838283	variable: wire-wound; 20 ohm ±20%; 2 w; includes reference part S2
R2	17K892469	fixed: wire-wound; 4 ohm ±2%; 1 w
	or17B821901	fixed: wire-wound; 4 ohm ±2%; 3 w
R3	6R6336	fixed: composition; 270 ohm ±10%; 1 w; ins.
R4	18D890193	variable: wire-wound; 10K ±10%; 2 w
		SWITCH,
S1	40A80248	toggle: spst
	or40K811824	toggle: spst
S2		for reference only
		BOARD, terminal:
TB1	31R121167	2 solder lug terminals, 1 insulated, 1 grounded
		CABLE ASSEMBLY, power:
W1	30B892534	2 conductor; rubber covered; 10 ft. long; includes male 2 contact AC connector; does not include 42B850861 RETAINER, cable: retainer must be ordered separately
		LINE, RF transmission:
W2	1V836807	includes: 30B475378 CABLE, RF: coaxial; RG-58A/U; 7-1/2 inch length required Reference parts J1, P1
W3	1K800193	includes: 30B475378 CABLE, RF: coaxial RG-58A/U; 2 ft. length required Reference parts P2, P3

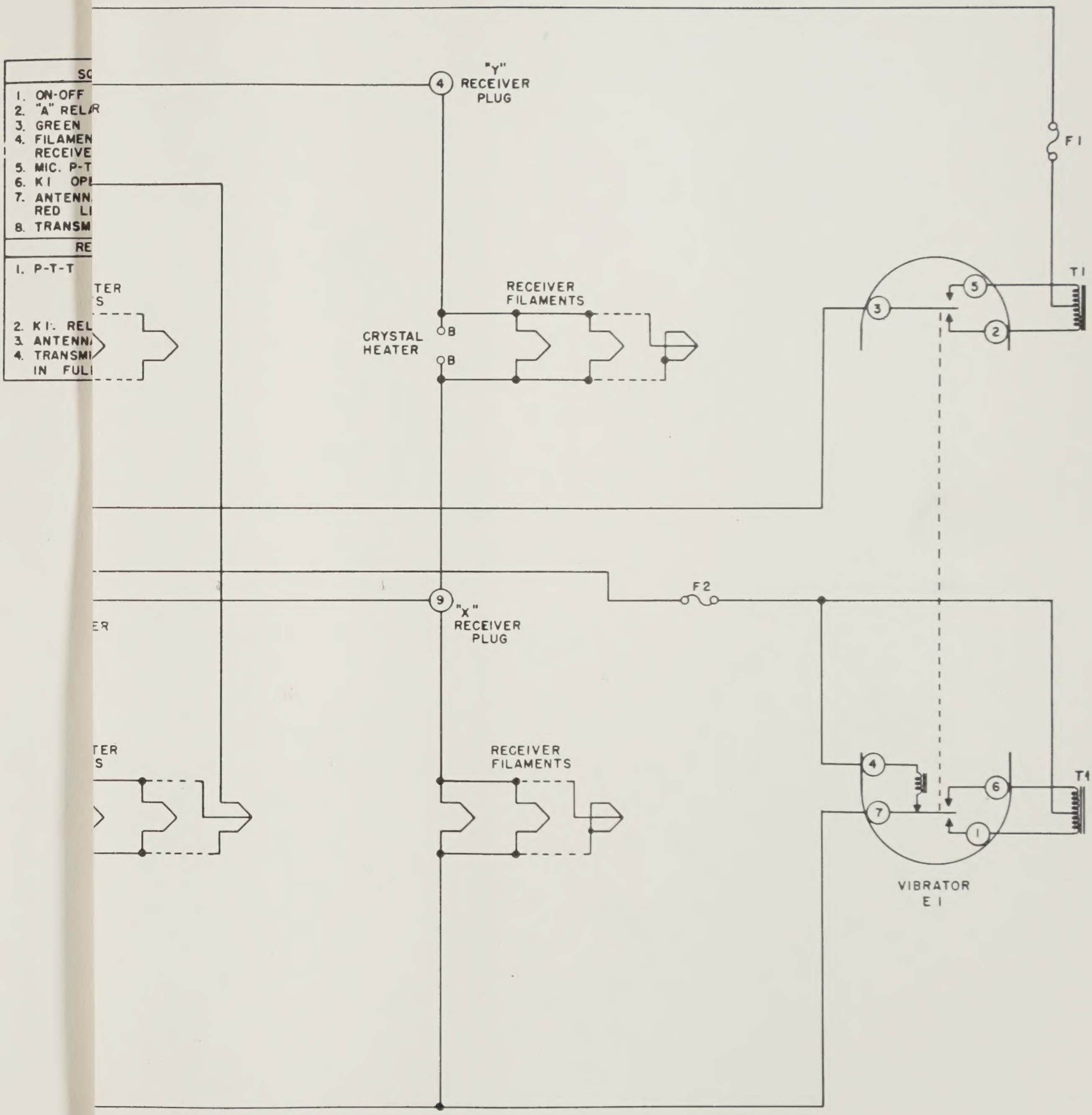
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		LIGHT, indicator:
XDS1	60A848400	single contact bayonet base; RED lens
XDS2	60K848401	single contact bayonet base; GREEN lens
NON-REFERENCED ITEMS		
	55A893871	LOCK: includes two 55K893872 KEYS
	55A893873	HANDLE
	35B834775	CLOTH, grille
	30B844653	KNOB, control



D43GGV Series Radio Sets
Simplified Functional Diagram
Motorola No. 63E854644-A
1/15/60-CP



T43GGV Series Radio Sets
Simplified Functional Diagram
Motorola No. 63E854643-A
1/15/60-CP



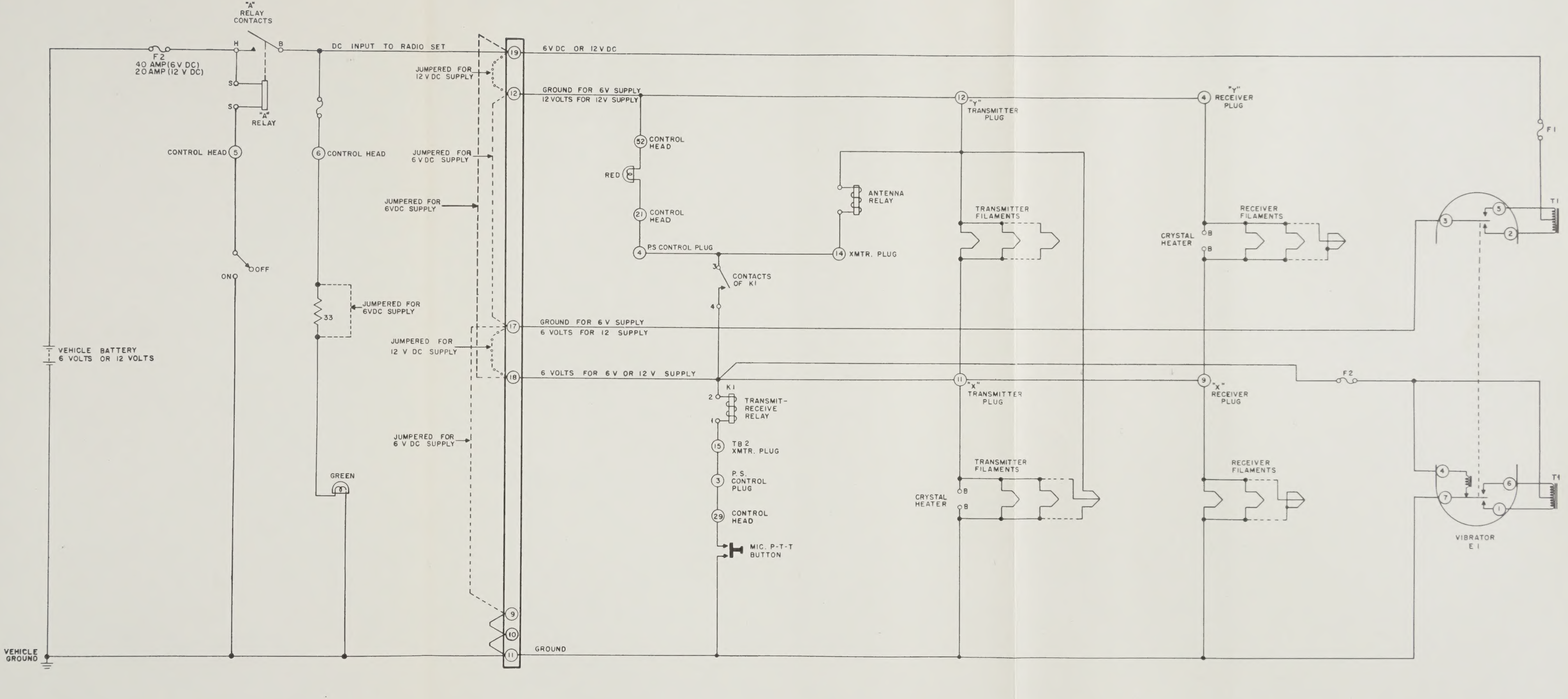
T43GGV Series Radio Sets
Simplified Functional Diagram
Motorola No. 63E854643-A
1/15/60-CP

SQUENCE OF OPERATIONS

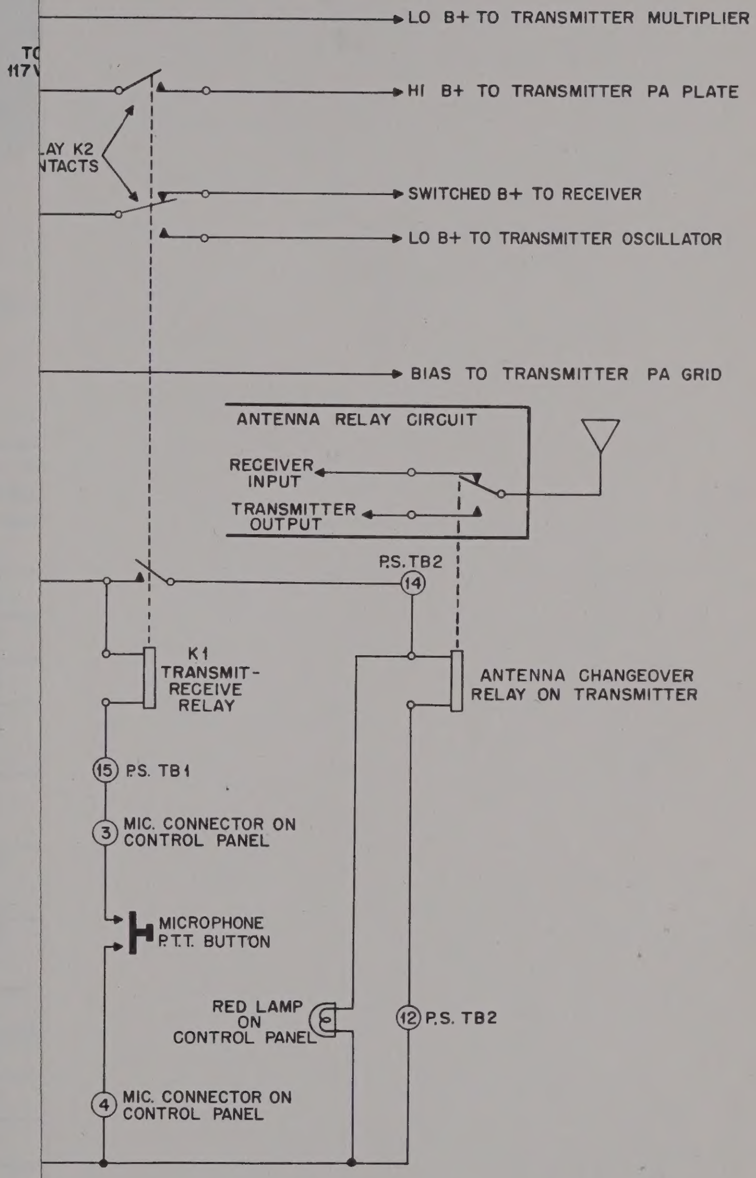
1. ON-OFF SWITCH SET TO "ON".
2. "A" RELAY OPERATES.
3. GREEN LIGHT GOES ON.
4. FILAMENTS AND VIBRATORS ENERGIZED, RECEIVER IN FULL OPERATION.
5. MIC. P-T-T BUTTON DEPRESSED.
6. K1 OPERATES
7. ANTENNA RELAY OPERATES AND RED LIGHT GOES ON.
8. TRANSMITTER ON AIR. RECEIVER OFF

RELEASE OF P-T-T BUTTON

1. P-T-T BUTTON RELEASED.
2. K1. RELEASES
3. ANTENNA RELAY RELEASES, RED LIGHT OFF.
4. TRANSMITTER OFF AIR. RECEIVER BACK IN FULL OPERATION.



T43GGV Series Radio Sets
Simplified Functional Diagram
Motorola No. 63E854643-A
1/15/60-CP

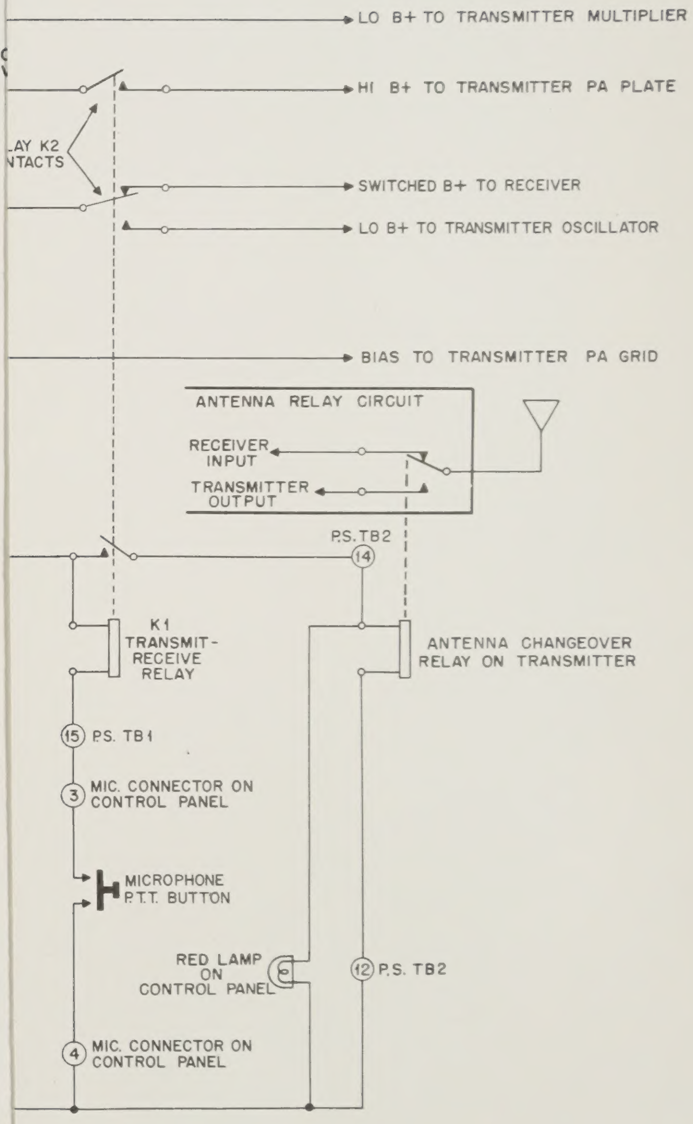

LO B+ TO TRANSMITTER MULTIPLIER
TC
117V
HI B+ TO TRANSMITTER PA PLATE
AY K2
NTACTS
SWITCHED B+ TO RECEIVER
LO B+ TO TRANSMITTER OSCILLATOR
BIAS TO TRANSMITTER PA GRID
ANTENNA RELAY CIRCUIT
RECEIVER INPUT
TRANSMITTER OUTPUT
P.S. TB2
14
K1 TRANSMIT-RECEIVE RELAY
ANTENNA CHANGEOVER RELAY ON TRANSMITTER
15
P.S. TB1
3
MIC. CONNECTOR ON CONTROL PANEL
MICROPHONE P.T.T. BUTTON
RED LAMP ON CONTROL PANEL
12
P.S. TB2
4
MIC. CONNECTOR ON CONTROL PANEL

TERMINAL LEGEND

CODE	CONNECTOR
P.S. TB1	POWER SUPPLY, TERMINAL BOARD TB1
P.S. TB2	POWER SUPPLY, TERMINAL BOARD TB2

EXAMPLE : P.S. TB1 ⑭ – POWER SUPPLY, TERMINAL BOARD TB1, TERMINAL # 14

A-C Utility Radio Sets
Simplified Functional Diagram
Motorola No. 63D854646-A
1/15/60-CP

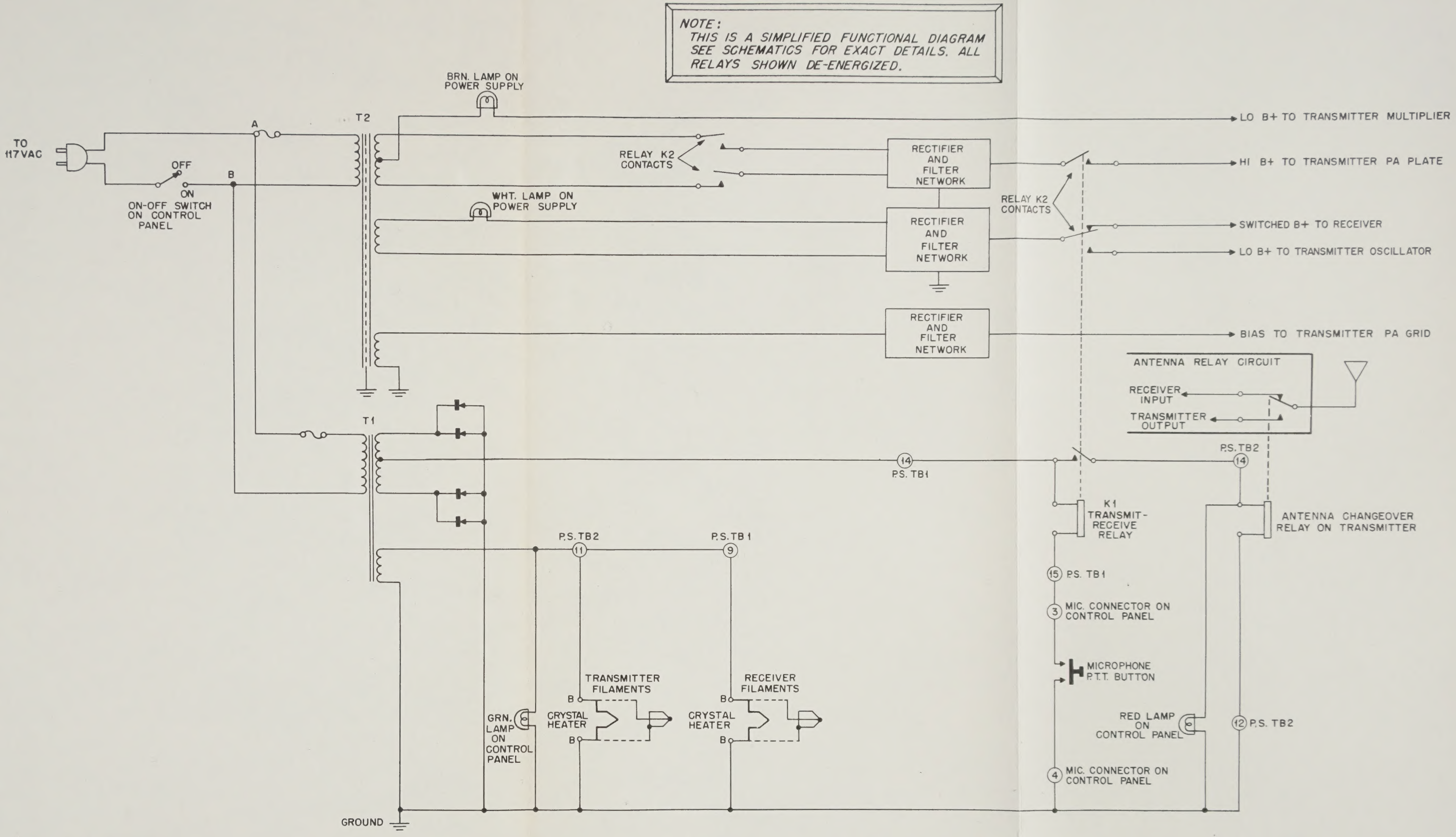

LO B+ TO TRANSMITTER MULTIPLIER
TC
117V
HI B+ TO TRANSMITTER PA PLATE
LAY K2
NTACTS
SWITCHED B+ TO RECEIVER
LO B+ TO TRANSMITTER OSCILLATOR
BIAS TO TRANSMITTER PA GRID
ANTENNA RELAY CIRCUIT
RECEIVER INPUT
TRANSMITTER OUTPUT
P.S. TB2
14
K1 TRANSMIT-RECEIVE RELAY
ANTENNA CHANGEOVER RELAY ON TRANSMITTER
15 P.S. TB1
3 MIC. CONNECTOR ON CONTROL PANEL
MICROPHONE P.T.T. BUTTON
RED LAMP ON CONTROL PANEL
12 P.S. TB2
4 MIC. CONNECTOR ON CONTROL PANEL

TERMINAL LEGEND

CODE	CONNECTOR
P.S. TB1	POWER SUPPLY, TERMINAL BOARD TB1
P.S. TB2	POWER SUPPLY, TERMINAL BOARD TB2

EXAMPLE : P.S. TB1 ⑭ – POWER SUPPLY, TERMINAL BOARD TB1, TERMINAL # 14

A-C Utility Radio Sets
Simplified Functional Diagram
Motorola No. 63D854646-A
1/15/60-CP


NOTE:
THIS IS A SIMPLIFIED FUNCTIONAL DIAGRAM
SEE SCHEMATICS FOR EXACT DETAILS. ALL
RELAYS SHOWN DE-ENERGIZED.
TO 117VAC
OFF
ON
ON-OFF SWITCH ON CONTROL PANEL
A
B
T2
BRN. LAMP ON POWER SUPPLY
WHT. LAMP ON POWER SUPPLY
RELAY K2 CONTACTS
RECTIFIER AND FILTER NETWORK
RECTIFIER AND FILTER NETWORK
RECTIFIER AND FILTER NETWORK
RELAY K2 CONTACTS
LO B+ TO TRANSMITTER MULTIPLIER
HI B+ TO TRANSMITTER PA PLATE
SWITCHED B+ TO RECEIVER
LO B+ TO TRANSMITTER OSCILLATOR
BIAS TO TRANSMITTER PA GRID
ANTENNA RELAY CIRCUIT
RECEIVER INPUT
TRANSMITTER OUTPUT
T1
14
P.S. TB1
P.S. TB2
14
K1 TRANSMIT-RECEIVE RELAY
ANTENNA CHANGEOVER RELAY ON TRANSMITTER
15 P.S. TB1
3 MIC. CONNECTOR ON CONTROL PANEL
MICROPHONE P.T.T. BUTTON
RED LAMP ON CONTROL PANEL
12 P.S. TB2
4 MIC. CONNECTOR ON CONTROL PANEL
P.S. TB2
11
P.S. TB1
9
TRANSMITTER FILAMENTS
RECEIVER FILAMENTS
B
B
B
B
GRN. LAMP ON CONTROL PANEL
CRYSTAL HEATER
CRYSTAL HEATER
GROUND

SEQUENCE OF OPERATIONS

"TURN-ON" OPERATION	"TURN-OFF" OPERATION
1. ON-OFF SWITCH SET TO ON POSITION.	1. PUSH-TO-TALK BUTTON RELEASED.
2. SWITCH APPLIES AC TO RADIO SET. GREEN LAMP GOES ON.	2. TRANSMIT-RECEIVE RELAY RELEASES.
3. FILAMENTS ENERGIZED. RECEIVER IN FULL OPERATION ("STANDBY").	3. ANTENNA RELAY RELEASES.
4. MIC. PUSH-TO-TALK BUTTON PRESSED.	4. TRANSMITTER OFF, RECEIVER BACK IN OPERATION. RED LIGHT GOES OUT ("STANDBY").
5. TRANSMIT-RECEIVE RELAY OPERATES.	
6. ANTENNA RELAY OPERATES.	
7. TRANSMITTER ON AIR, RECEIVER MUTED. RED LIGHT ON (ON-THE-AIR).	

TERMINAL LEGEND

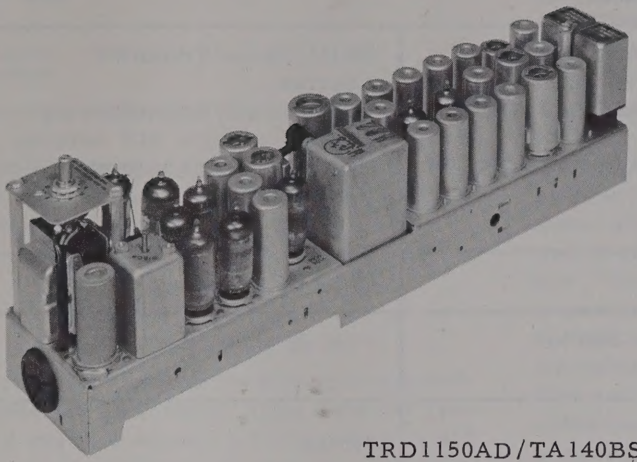
CODE	CONNECTOR
P.S. TB1	POWER SUPPLY, TERMINAL BOARD TB1
P.S. TB2	POWER SUPPLY, TERMINAL BOARD TB2

EXAMPLE: P.S. TB1 ⑭ – POWER SUPPLY, TERMINAL BOARD TB1, TERMINAL # 14

A-C Utility Radio Sets
Simplified Functional Diagram
Motorola No. 63D854646-A
1/15/60-CP

CE1225-F

RECEIVER



TRD1150AD/TA140BS-R2 RECEIVER

MODEL CHART

MODEL NUMBER	NO. OF FREQ.	FREQ. RANGE IN MC	CHANNEL SPACING
TRD1151AB/TA140BS-L	1	144-152	30 KC
TRD1152AB/TA140BS-H	1	152-174	30 KC
TRD1151AD/TA140BS-R2-L	2	144-152	30 KC
TRD1152AD/TA140BS-R2-H	2	152-174	30 KC
TRD1181AB/TA140BSQ-L	1	144-152	30 KC with Extended Low Audio Freq. Range
TRD1182AB/TA140BSQ-H	1	152-174	30 KC with Extended Low Audio Freq. Range
TRD1181AA/TA140BWQ-L	1	144-152	60 KC with Extended Low Audio Freq. Range
TRD1182AA/TA140BWQ-H	1	152-174	60 KC with Extended Low Audio Freq. Range
TRD1151AA/TA140BW-L	1	144-152	60 KC
TRD1152AA/TA140BW-H	1	152-174	60 KC
TRD1151AC/TA140BW-R2-L	2	144-152	60 KC
TRD1152AC/TA140BW-R2-H	2	152-174	60 KC

GUARANTEED PERFORMANCE SPECIFICATIONS

MODEL NUMBER	TRD1150AB/TA140BWS Series TRD1150AD/TA140BS-R2 Series TRD1180AB/TA140BSQ Series	TRD1150AA/TA140BW Series TRD1150AC/TA140BW-R2 Series TRD1180AA/TA140BWQ Series
CHANNEL SPACING	30 kc	60 kc
SELECTIVITY	-100 db at ±15 kc	-100 db at ±32 kc
MODULATION ACCEPTANCE	±5 kc	±15 kc
SENSITIVITY	Less than 0.50 microvolt for 20 db quieting; 50 ohms r-f input impedance	
FREQUENCY STABILITY AND TEMPERATURE RANGE	Oven type crystal maintains oscillator stability within ±0.0005% from -30°C to $+60^{\circ}$C ambient ($+25^{\circ}$C reference)	
SPURIOUS AND IMAGE REJECTION	More than 100 db	
SQUELCH	Noise compensated type, adjustable sensitivity, threshold sensitivity of 0.18 microvolt	
TUBE COMPLEMENT AND FUNCTION	6AK5 - r-f ampl. *6BC5 - oscillator 6AB4 - 1st mixer 6BH6 - 1st i-f ampl. 12AT7 - 2nd osc. - mixer 6CB6 - 2nd i-f ampl. (1) 6CB6 - 2nd i-f ampl. (2) 6CB6 - 2nd i-f ampl. (3) 6BH6 - 1st limiter 6BJ6 - 2nd limiter 6AL5 - discriminator 6BH6 - noise ampl. 6C4 - noise rectifier 12AT7 - audio and squelch ampl. 6AQ5 - audio output *two for 2-frequency models	
AUDIO OUTPUT	2 watts into 3.2 ohms at less than 10% distortion, except for TRD1180AA/TA140BWQ Series & TRD1180AB/TA140BSQ Series which have a 1-1/2 watt output	
AUDIO RESPONSE	De-emphasis 6 db per octave (within +1 db to -8 db) between 300 and 3000 cps, except for TRD1180AA/TA140BWQ Series & TRD1180AB/TA140BSQ Series which have an extended low frequency response.	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

1. DESCRIPTION

a. Application

The receivers listed in the model chart are designed to receive FM signals on one (or two) fixed, crystal-controlled frequencies in the 144-174 mc band. The receivers obtain operating voltages from the radio set power supply.

b. Design

The receiver incorporates a double-conversion superheterodyne circuit. The first i-f frequency is 12 mc; the second i-f frequency is 455 kc. The single-frequency chassis has 15 tubes; the two-frequency chassis has 16 (an additional control oscillator). A "permakay" i-f filter is the major factor in determining the signal reception bandwidth. On models designed for 30 kc channel spacing operation, the signals are attenuated - 100 db at ±15 kc. On 60 kc models the signals are attenuated - 100 db at ±32 kc.

The Model TRD1180AA/TA140BWQ series are essentially the same as Model TRD1150AA/TA140BW, but have extended low-frequency audio response for use in applications requiring "quik-call" decoders utilizing "low band" tones (100-312 cps) and for other applications where this type of response is required.

These receivers are designed for diversified mobile and a-c utility applications. When a unit is installed in a standard 10 inch width housing, it is wired directly to the power supply and is assembled in the drawer assembly without the aid of an auxiliary adapter. For standard 15 inch width housing installations, the receiver is assembled and connected to an adapter chassis. This complete assembly is mounted in the mobile drawer unit and is connected to other chassis of the equipment by means of "plug-in" type cables.

c. Basic Receiver Circuitry

The basic receiver circuit consists of the following stages: an r-f amplifier, a first local oscillator, a first mixer, a first i-f amplifier, a second local oscillator, a second mixer, three second i-f amplifiers, two limiters, a discriminator and two stages of audio amplification.

d. Two-Frequency Models

Two-frequency receiver models are the same as the single-frequency receivers except for the addition of another first oscillator and control crystal. Two-frequency models receive signals on two specific, crystal-controlled frequencies in the band. Only one frequency can be received at a time. The two-frequency receivers are designed for operation with a frequency separation between channels as great as 180 kc without any change in performance specifications. An external switch is used to select frequencies. The switch is connected into the cathode circuits of the two first local oscillator stages. In the F1 position the switch grounds the cathode of the #1 oscillator, permitting that stage to operate normally. At the same time it opens the cathode of the #2 oscillator to disable the #2 stage. In the F2 position the switch reverses the connections and selects the #2 local oscillator. The F1-F2 switch is part of the control head in mobile radio sets.

e. Chassis Complement

Each receiver consists of a basic chassis and a number of other items depending upon the frequency range, number of operating frequencies and channel spacing operation. The receivers are factory assembled from the sub-assemblies to form a compact single unit. The items included in each receiver are summarized in the following chart.

2. OPERATION

a. Stage Analysis

This receiver operates in accordance with basic FM receiver operation theory. The stage analysis given in these instructions is but a brief summary of the pertinent points. To follow the discussion refer to the block diagram. This diagram shows stage-by-stage signal flow and operating frequencies.

b. R-F Amplifier

The carrier signals received at the antenna are coupled to the grid of the r-f amplifier by the impedance-matching network in the input circuit.

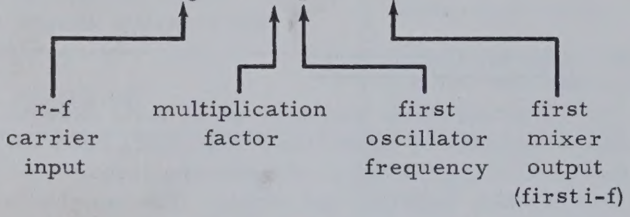
The r-f stage provides some amplification of the signals, however, its main purpose in the circuit is to improve sensitivity and selectivity. The gain of this stage is designed to provide the optimum signal-to-noise ratio in the signals sent to the first mixer. In the output of this stage three hi-Q, critically coupled tuned circuits provide very high selectivity in the signals which pass on to the mixer.

c. First Oscillator and Mixer

The first oscillator generates a signal which is multiplied five times and heterodyned with the incoming r-f carrier in the first mixer stage. The difference between these two frequencies is used as the mixer output. This output is a 12 mc signal which carries the modulation originally impressed on the incoming r-f carrier.

These frequency relationships can be expressed as follows:

$$f_c - 5f_1 = 12\text{ mc}$$



$$f_1 = \frac{f_c - 12\text{ mc}}{5}\text{; where } f_c \text{ is the carrier freq.}$$

The multiplied oscillator frequency and the r-f carrier are used as the input to the first mixer. The output from the first mixer is called the first intermediate frequency (first i-f).

d. First I-F and Second Mixer

The signals are amplified in the first i-f amplifier and applied to the second mixer along with an injection frequency generated in the second local oscillator. The second local oscillator frequency is controlled by the i-f crystal. This frequency is 12455 kc, the same for all receivers regardless of r-f carrier frequency. The difference between the second local oscillator frequency and the first i-f is the second mixer output. This output is a 455 kc signal which carries the audio modulation. The frequency relationships of these three stages are as follows:

Second local oscillator freq.	12455 kc
First intermediate freq. . . .	12000 kc
Difference freq. (second i-f)	455 kc

e. Second I-F

A "permakay" i-f filter is used in the second i-f before the amplification stages. This filter is permanently sealed in polyesterstyrene and is unconditionally guaranteed for the life of the receiver provided the seal is unbroken and the housing is not tampered with. This filter is the major factor in determining the bandwidth of the receiver. It greatly attenuates the signal outside the pre-determined pass-band. Signals leaving the filter are amplified by three stages of second i-f amplification (tubes V106, V107 and V108) and applied to the limiter stages.

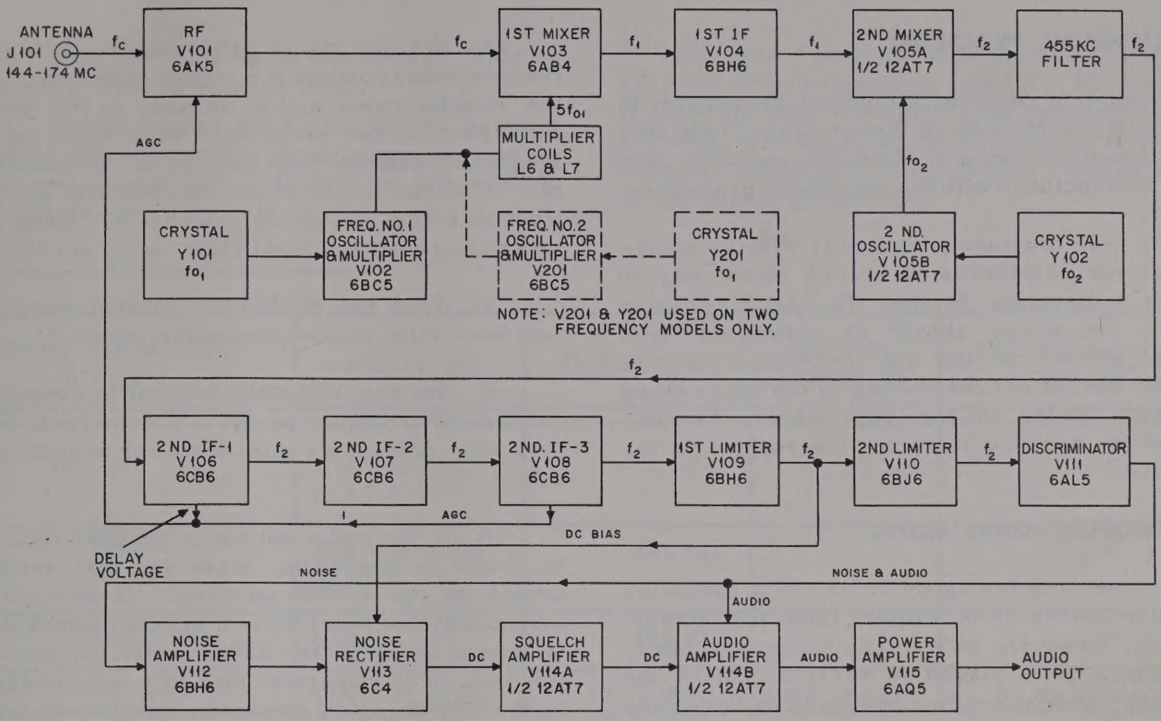
f. Limiters, Discriminator and Audio Stages

The two limiter stages, tubes V109 and V110, clip the tops and bottoms of the incoming signals, thereby virtually eliminating the noise which characteristically "rides" the signals in the form of amplitude modulation. These stages are largely responsible for the "quieting" effect inherent in the FM communications receiver when it picks up an on-frequency signal. The limiter output is sent to the discriminator, tube V111, which translates frequency deviations into corresponding amplitude variations, thereby detecting the audio modulation. The audio amplification stages provide two watts audio output to a three ohm load.

g. Noise-Actuated Squelch Circuit

The noise-actuated squelch circuit consists of a noise amplifier, a noise rectifier, a d-c amplifier and associated circuit components, as shown on the schematic diagram. The discriminator output is applied to the input of the noise amplifier, V112. The input r-c network greatly attenuates the low-frequency components but passes frequencies above 3000 cps. These random frequencies are applied to the grid of V112 and amplified. In the cathode of the noise amplifier the variable SQUELCH control varies the gain of the tube by adjusting its bias. The setting of this control is covered in the following paragraph.

The output of the noise amplifier drives the noise rectifier, V113. The rectified noise signal



63C839284-B

DIAGRAM NO. 63C839284

LEGEND:

f_c = CARRIER FREQUENCY = 144-174 MC.

f_{o1} = 1ST. OSCILLATOR FREQUENCY = $\frac{f_c - f_1}{5}$ = 26.4-32.4 MC.

f_1 = 1ST. INTERMEDIATE FREQUENCY = $f_c - 5\, fo_1$ = 12 MC.

f_2 = 2ND. INTERMEDIATE FREQUENCY = $fo_2 - f_1$ = 455 KC.

fo_2 = 2ND. OSCILLATOR FREQUENCY = 12.455 MC.

BLOCK DIAGRAM

appears as positive voltage across the load resistor, R152. This positive voltage is added to a steady negative bias taken from the second limiter stage. The resultant of these two voltages is applied to the grid of the d-c amplifier tube. In the no-signal condition, i.e., noise alone, the resultant voltage is zero or somewhat positive. The d-c amplifier conducts and cuts off the audio amplifier tube. This keeps the speaker silent when signals are not being received. When signals are received the noise is greatly reduced and the rectified noise output is not enough to overcome the steady negative bias on the grid of the d-c amplifier. In this condition, the d-c amplifier is cut off and the audio amplifier operates, passing on the received audio signals.

h. Squelch Control

The SQUELCH control limits the gain of the noise amplifier tube. In practice, this control is adjusted for a "threshold" setting. This is the point where the rectified noise voltage will bias the grid of the d-c amplifier so that the audio amplifier is just barely cut-off. Then, when a weak signal is received a slight reduction in noise will cut off the d-c amplifier and allow the audio amplifier to conduct.

Setting of the SQUELCH control is described in the radio set INSTALLATION AND OPERATION instructions.

i. Audio Level

The audio level control on the receiver chassis is used to set the maximum audio level available at the VOLUME control on the control unit. This permits future adjustments to compensate for variations in tube characteristics, resistor and capacitor tolerances and transmitter deviation. This control has more than adequate range of audio drive to the 3 ohm speaker.

Setting of the audio level control is described in the radio set INSTALLATION AND OPERATION instructions.

3. ALIGNMENT PROCEDURE

A complete receiver alignment procedure, in chart form, is included in this section. Test set-up information, using a Motorola portable test set, is also included with the alignment procedure.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. To check receiver circuits the meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. Refer to the applicable schematic diagram for specific metering pin receptacle information.

4. PRE-OPERATIONAL NOTES

The receiver is aligned to its exact operating frequency before it is shipped from the factory. It should, however, be checked for proper operation before it is placed in service. Make the frequency check described in Step 12 of the alignment chart in this section. Also take meter readings for the first five entries in the stage measurement chart. If the readings are beyond the allowable limits, realign the receiver according to the alignment chart.

a. Sensitivity Check (20 DB Quieting)

The receiver sensitivity check should be made in a well shielded location in the absence of extraneous electrical noise. The sensitivity, or quieting signal, is that input signal necessary to reduce the output noise at the speaker by 20 db.

The following equipment is required to accurately measure the quieting signal:

Signal Generator (Motorola Model T1034A, or equivalent)

Motorola Portable Test Set (Model TU546 Series)

(1) Warm up the signal generator for 1-1/2 to 2 hours.

(2) Plug the test set metering cable into the test set and the other end into the 11-pin receiver metering socket on the radio set.

(3) Place the test set function selector switch in the RCVR position. Place the position selector in position 11, AUDIO.

(4) Set the signal generator to the carrier frequency and connect the signal generator, using the coaxial cable and 6 db pad, to the antenna connector on the radio set. The exact carrier frequency will be indicated by a "0" reading on the "0" center scale of the test set with the position selector switch in position 4. Return the switch to position 11, AUDIO.

(5) Turn the SQUELCH control on the control head fully counterclockwise (open).

(6) Set the VOLUME control to provide any convenient reading on the 0-2 v a-c scale on the test set, preferably mid-scale for ease in reading.

(7) If the radio set has a speaker connected to it and in operation, place the test set SPKR switch to the OPEN position. If the radio set under test does not have a speaker connected to it, place the test set SPKR switch to the LOAD position. It is important that only one speaker be in the circuit, i.e., either the speaker on the radio set or the speaker on the test set. Now note the exact meter reading and mark it down for use as a reference later.

(8) Place the test set multiplier switch to the 0.2 v a-c position and hold it there. This makes the meter exactly 10 times, or 20 db, more sensitive than the normal 2 v a-c position.

(9) Increase the signal until the meter needle is in exactly the same position as noted in step (7). The noise has been reduced 20 db. The receiver sensitivity in microvolts can now be read on the signal generator.

b. Alternate Method -- 20 DB Quieting Measurement

Equipment required:

a-c vtvm

signal generator (Motorola Model T1034A, or equivalent)

(1) Connect the vtvm across the voice coil terminals (terminal #1 and #2 on the power supply receiver terminal board).

(2) With noise only, turn the VOLUME control to a normal listening level and turn the SQUELCH control fully counterclockwise (open).

(3) Note the reading on the meter. This is a reference level to be used later.

(4) Set the signal generator to the carrier frequency and connect the signal generator, using the coaxial cable and 6 db pad, to the antenna connector on the radio set.

(5) Inject a signal until the noise is reduced 1/10 the value as noted in step (3). For example, if step (3) was 1.0 volt, then step (5) should be 0.1 volt. The noise has been reduced 20 db. The receiver sensitivity in microvolts can now be read on the signal generator.

c. Average Stage Measurements

APPROX. MICROVOLT INPUT	INPUT TO	FREQUENCY	METER POSITION	METER READING OR DB.
150,000	Pin 1 of V107 2nd I-F -2	455 KC	1	-5
2000	Pin 1 of V106 2nd I-F -1	455 KC	1	-5
5000	Filter	455 KC	1	-5
5.0	Pin 1 of V104 1st I-F	12.0 MC	*DB Meter	20 db (quieting)
150		12.0 MC	1	-5
3.8	Pin 6 of V103 1st Mixer	12.0 MC	*DB Meter	20 db (quieting)
30.0		12.0 MC	1	-5
2.5	Pin 1 of V101 1st R-F	F_c	*DB Meter	20 db (quieting)
14.0		F_c	1	-5
6.0	Antenna	F_c	1	-5
0.5 or less	Antenna	F_c	*DB Meter	20 db (quieting)
Noise	Antenna	No Signal	1	-0.1 to -1
Noise	Antenna	No Signal	2	-18 to -40
Noise	Antenna	No Signal	4	**0
Noise	Antenna	No Signal	5	-12 to -16
Noise	Antenna	No Signal	6	-10 to -40

NOTE

A Model T1034A Signal Generator was used when taking readings on V101, V103, and V104. A Model 65B Signal Generator with a 30 ohm terminated output cable was used when taking all other readings.

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* Refer to paragraph 4 when making this measurement.

** A meter reading of up to ±1 ua is allowable without any degradation.

AEPD-2006 (CE1225-C)

AEPD-1406

	ALIGNMENT FREQUENCY	ADJUSTMENT	TU546 TEST SET SWITCH POSITION	METER READING
il (see DETAIL A, lower left). l and set the ON-OFF switch to he probe in its position and place	455 kc, sharp tuning	T1 bottom slug	5	Maximum
meter reading (selector switch	455 kc, sharp tuning	T1 top slug	4	Zero
that an increase of signal to keep the input at a constant	455 kc, sharp tuning	L16	2	Maximum
5 ua with the selector switch in	455 kc, broad tuning	L15	1	Maximum
e the test set ON-OFF switch	455 kc, sharp tuning	L14	1	Maximum
the illustration. After adjusting (pin 1) of V104. The signal ion 1 or 2). Adjust L13 for a ge. The peak found when the nd L11 for a maximum meter	12 mc, sharp tuning	L13, L12 and L11	1 or 2	Maximum
(pin 6) of V103 and adjust L10,	12 mc, sharp tuning	L10, L9 and L8	1 or 2	Maximum
he screwdriver adjustment slot r switch in position 6. If le setting trimmer C204 and	Receiver crystal frequency, sharp tuning	L5 (L201)	6	Maximum
ed. To do this follow the pro- o pin 6 of V103 instead of pin 7, osition 1 or 2).	Carrier frequency, sharp tuning	L7 L6	1 or 2	Maximum
gnal loosely to the grid (pin 1)	Carrier freq., sharp tuning	L4, L3 and L2	1 or 2	Maximum
e a 6 db, 50 ohm, attenuation	Carrier freq., sharp tuning	L1	1 or 2	Maximum
tended to receive. A zero Check the final setting by the trimmer is rotated. Set	Carrier frequency, sharp tuning	C110, C204	4	Zero
while making the adjustments. mitter, signal generator or b). Turn VOLUME control on . Set the selector switch to educe the meter reading more	Carrier freq., slight adj.	L14	2	Reduce audible noise
be accomplished only if	Carrier freq., sharp tuning	L1	1 or 2	Maximum

Receiver Alignment Procedure
Motorola No. EPD-2005-A
1/15/60-CP

AEPD-2006 (CE1225-C)

AEPD-1406

HOW TO SET UP THE P-8500 AND P-8501 SERIES TEST SETS FOR DISCRIMINATOR AND 455 KC ALIGNMENT

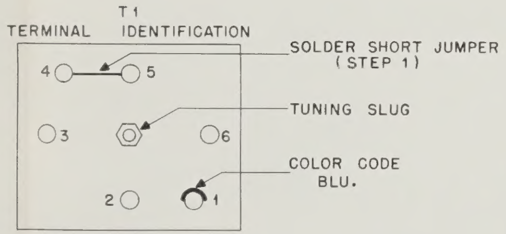
1. Set the REC.-XMTR. 0-50 UA switch to the REC position.
2. Plug a 455 kc crystal into the two-pin crystal socket.
3. Set the GRID CURRENT-METER-FIELD STRENGTH selector switch to the GRID CURRENT position.
4. Set the ATTENUATOR control for maximum output (10).
5. Place the test set ON-OFF switch in the ON position. (Test set operates on internal battery. Conserve battery life by keeping switch OFF when set is not in use.)
6. Adjust the frequency control (ADJ) for a maximum meter reading.
7. Set the ON-OFF switch to the OFF position.
8. Set the GRID CURRENT-METER-FIELD STRENGTH switch to the METER position.
9. Plug the test set metering cable into the METER receptacle on the receiver chassis.
10. Connect one end of the test set extension cable to the RF OUTPUT jack on the test set. Connect the other end of the extension cable to the RF probe cable.

HOW TO SET UP THE TU546 SERIES TEST SETS FOR DISCRIMINATOR AND 455 KC ALIGNMENT

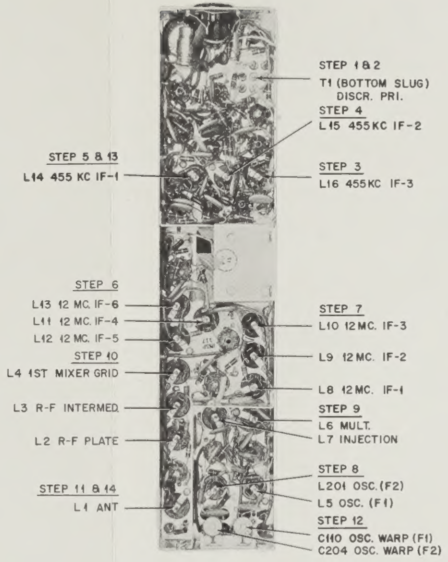
1. Set the function selector switch to the RCVR position.
2. Connect the 20-pin metering cable into the receptacle on the test set. Plug the other end (11-pin) into the metering socket on the receiver.
3. Connect one end of the test set rf extension cable to the rf connector on the test set. Connect the other end of the extension cable to the rf probe cable.
4. Place the oscillator and meter reversing switch to the 455 kc position.

TEST SET SELECTOR SWITCH POSITIONS

P-8500 & P-8501 Series Test Sets	1	2	+4 & -4	5	6
TU546 Series Test Sets	1	2	4	5	6
Circuit Metered	2nd I-F (#3) Grid	1st Lim. Grid	Discr. Output	Discr. Input	1st Osc. Grid



DETAIL A



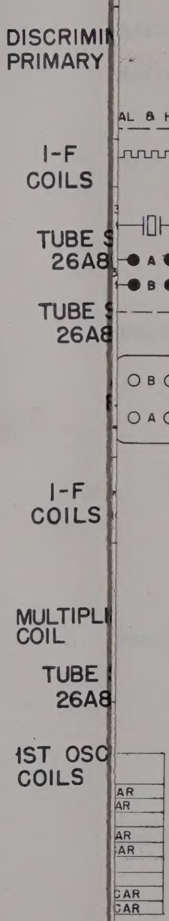
HOW TO SET UP THE SIGNAL GENERATOR* FOR 12 MC. I.F. ALIGNMENT

1. Couple the signal generator output loosely to the grid (pin 7) of V105. Couple just enough input to give a small meter reading.
2. Set the test set selector switch to position 4. Turn on the test set.
3. Set the signal generator frequency for approximately 12 mc.
4. Locate the exact 12 mc point by rotating the generator dial back and forth around the 12 mc setting until you obtain a meter reading of exactly zero (position 4). The meter reading should go above and below zero as the dial is rotated. Leave the generator set for zero meter reading. Make sure the signal remains constant throughout the alignment (generator may drift).

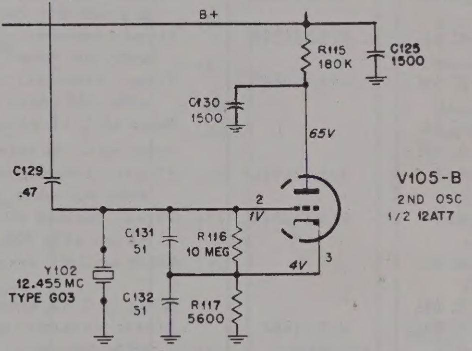
*Use a Motorola Model T1034A or equivalent.

STEP	STAGE, TEST CONDITIONS AND PROCEDURE	ALIGNMENT FREQUENCY	ADJUSTMENT	TU546 TEST SET SWITCH POSITION	METER READING
1	DISCRIMINATOR PRIMARY -- Solder a short jumper across terminals 4 and 5 of the discriminator secondary coil (see DETAIL A, lower left). Set up the Motorola Test Set as described in the left hand column. Place the test set selector switch in position 1 and set the ON-OFF switch to the ON position. Move the rf probe around near pin 1, V106, until the meter reading is at least 15 ua. Secure the probe in its position and place the selector switch in position 5. Adjust T1 (bottom slug) for maximum meter reading. Unsolder the jumper.	455 kc, sharp tuning	T1 bottom slug	5	Maximum
2	DISCRIMINATOR SECONDARY -- With the rf probe placed as in step 1 adjust the top slug of T1 for exactly zero meter reading (selector switch in position 4).	455 kc, sharp tuning	T1 top slug	4	Zero
3	455 KC, I-F COIL L16 -- Place the rf probe near the input to the 455 kc I-F filter. Couple the signal loosely so that an increase of signal strength will produce a linear increase in meter reading (switch in position 1 or 2). Secure the probe in position to keep the input at a constant level. Adjust L16 for a maximum meter reading with the switch in position 2.	455 kc, sharp tuning	L16	2	Maximum
4	455 KC, I-F COIL L15 -- Couple the signal to the I-F filter so as to obtain a maximum reading of approximately 5 ua with the selector switch in position 1. Adjust L15 for a maximum reading.	455 kc, broad tuning	L15	1	Maximum
5	455 KC, I-F COIL L14 -- Use the same conditions as in step 4. Adjust L14 for a maximum meter reading. Place the test set ON-OFF switch in the OFF position and remove the rf probe.	455 kc, sharp tuning	L14	1	Maximum
6	12 MC, I-F COILS L13, L12 and L11 -- Set up the Model T1034A Signal Generator (or equivalent) as described below the illustration. After adjusting the signal generator set the test set selector switch to position 1 or 2 and couple the generator output to the grid (pin 1) of V104. The signal must be coupled loosely so that an increase of signal strength produces a linear increase in meter reading (position 1 or 2). Adjust L13 for a maximum meter reading with switch in position 1 or 2, note that two peaks are present within the coil tuning range. The peak found when the slug is nearest the top of the coil (as viewed from bottom of chassis) is the proper alignment peak. Adjust L12 and L11 for a maximum meter reading (position 1 or 2).	12 mc, sharp tuning	L13, L12 and L11	1 or 2	Maximum
7	12 MC. I-F COILS L10, L9 and L8 --Follow the same procedure as in step 6 except couple the signal to the grid (pin 6) of V103 and adjust L10, L9 and L8; no double peaks will be found.	12 mc, sharp tuning	L10, L9 and L8	1 or 2	Maximum
8	FIRST OSCILLATOR COIL L5 -- Uncouple the signal generator. Position the ceramic trimmer, C110, so that the screwdriver adjustment slot is parallel with the length of the receiver chassis. Adjust coil L5 for a maximum meter reading with the selector switch in position 6. If 2-frequency, set F1-F2 switch on control head to F1 position while adjusting L5. Then repeat in F2 position while setting trimmer C204 and adjusting coil L201.	Receiver crystal frequency, sharp tuning	L5 (L201)	6	Maximum
9	**MULTIPLIER COILS L7 AND L6 -- The signal generator must be set for the exact carrier frequency to be received. To do this follow the procedure outlined below the illustration except select the carrier frequency instead of 12 mc and couple the signal to pin 6 of V103 instead of pin 7, V105.** With the generator output coupled loosely to pin 6, V103, adjust L7 and L6 for maximum meter reading (position 1 or 2).	Carrier frequency, sharp tuning	L7 L6	1 or 2	Maximum
10	RF COILS L4, L3 and L2 -- Keep the signal generator set for the carrier frequency as in step 10. Couple the signal loosely to the grid (pin 1) of V101. Adjust L4, L3 and L2 for maximum reading (position 1 or 2).	Carrier freq., sharp tuning	L4, L3 and L2	1 or 2	Maximum
11	ANTENNA COIL L1 -- Connect the signal generator output to the antenna receptacle on the receiver chassis. Use a 6 db, 50 ohm, attenuation pad between the generator and the receiver input. Adjust L1 for maximum reading.	Carrier freq., sharp tuning	L1	1 or 2	Maximum
12	FREQUENCY CHECK -- Transmit the carrier frequency from the transmitter which this receiver is normally intended to receive. A zero meter reading indicates that the receiver is on frequency. Adjust trimmer C110 to obtain a zero meter reading. Check the final setting by rotating C110 back and forth while observing the meter. The reading should go above and below the zero point as the trimmer is rotated. Set C110 for exactly zero meter reading. On 2-frequency receivers, adjust C204 for the number 2 frequency.	Carrier frequency, sharp tuning	C110, C204	4	Zero
13	IGNITION NOISE ADJUSTMENT -- Install the receiver in the vehicle. Start the vehicle engine and allow it to run while making the adjustments. Turn the receiver ON and allow it to warm up for five minutes. Radiate a carrier frequency signal from a transmitter, signal generator or test set (see test set instruction manual). The signal should be just strong enough to produce quieting (20 to 30 db). Turn VOLUME control on control head to normal usable level. Plug the test set metering cable into the METER receptacle on the receiver. Set the selector switch to position 2 and note the meter reading. Adjust coil L14 very slightly to reduce audible ignition noise. DO NOT reduce the meter reading more than one-half microampere.	Carrier freq., slight adj.	L14	2	Reduce audible noise
14	ANTENNA COIL L1 -- Peak L1 with the receiver's transmission line and antenna connected. However, this can be accomplished only if a weak carrier signal of the proper frequency can be heard (perhaps from a distant mobile radio set).	Carrier freq., sharp tuning	L1	1 or 2	Maximum

AEPD-2004-A (CE1325A)

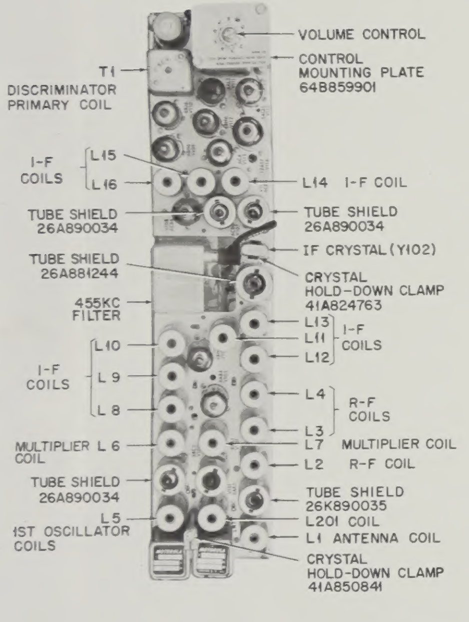


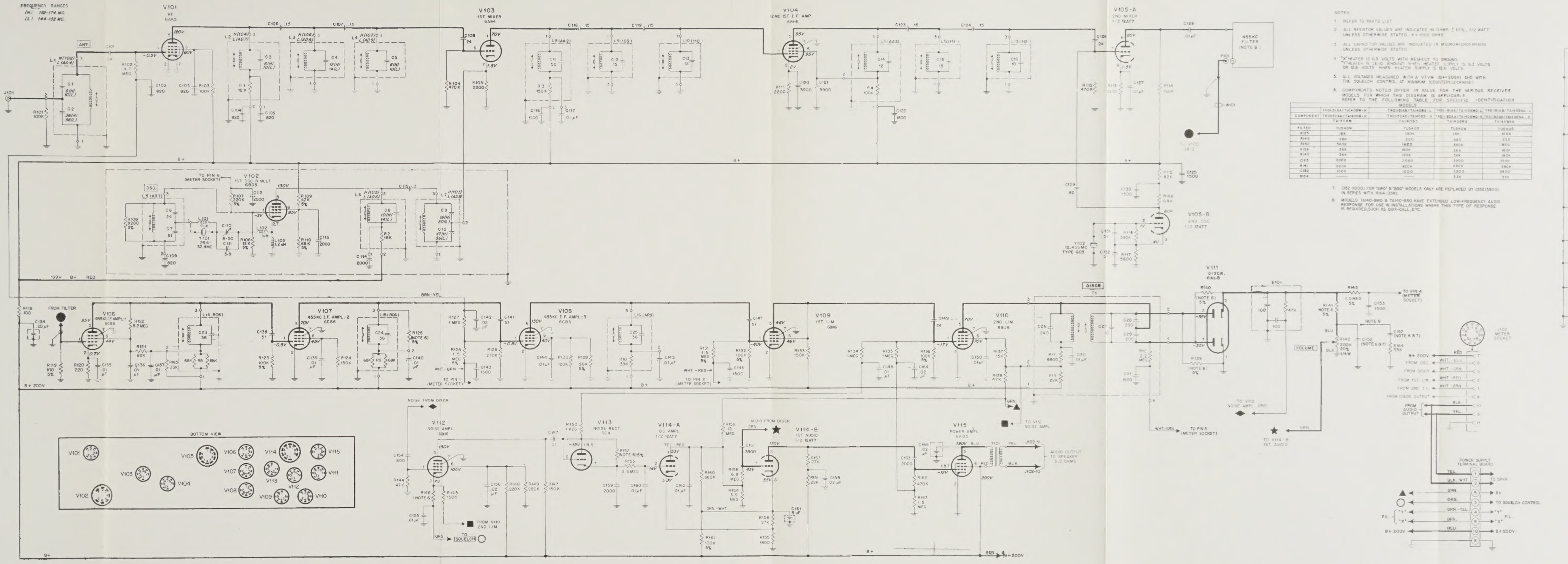
REVISIONS

	DIAG. ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
63E839287	L	TA140-BW-7 TA140-BX-7 TA140-BS-8 TA140-BWQ-5 TA140-BSQ-1 TA163-AW-5 TA163-AS TA163-AX-5 TRD1151AA/ TA140BW-L-8 TRD1152AA/ TA140BW-H-8 TA140-BX-8	R152	WAS 820K	V114-A GRID
	M	TRD1151AB/ TA140BS-L-9 TRD1152AB/ TA140BS-H-9 TRD1181AA/ TA140BWQ-L-6 TRD1182AA/ TA140BW-H-6 TRD1181AB/ TA140BSQ-L-2 TRD1182AB/ TA140BSQ-H-2 TA163-AW-6 TA163-AS-1 TA163-AX-6	R165	33K RESISTOR ADDED BETWEEN TERMINALS #1 AND #2 OF COIL L14 (BC6)	V107-1
	N	TRD1151AA/ TA140BW-L-9 TRD1152AA/ TA140BW-H-9 TRD1151AB/ TA140BS-L-10 TRD1152AB/ TA140BS-H-10	R115 R116 R166 C129	WAS 180K WAS 10 MEG ADDED (6.8K) RELOCATED AND WAS .47 UUF CIRCUIT WAS AS SHOWN BELOW  B+ R115 180K C125 1500 C130 1500 65V C129 .47 V105-B 2ND OSC 1/2 12AT7 2 1V C131 51 R116 10 MEG 3 4V Y102 12.455 MC TYPE G03 C132 51 R117 5600	2ND OSC.
63E862494	O			DIAGRAM NUMBER CHANGED. MODEL TA140BX AND TA163 MODEL SERIES DELETED.	

Receiver, Single-Frequency, 144-174 MC
Schematic Diagram
Motorola No. 63E862494-O
1/15/60-CP

AEPD-2004-A (CE1325A)



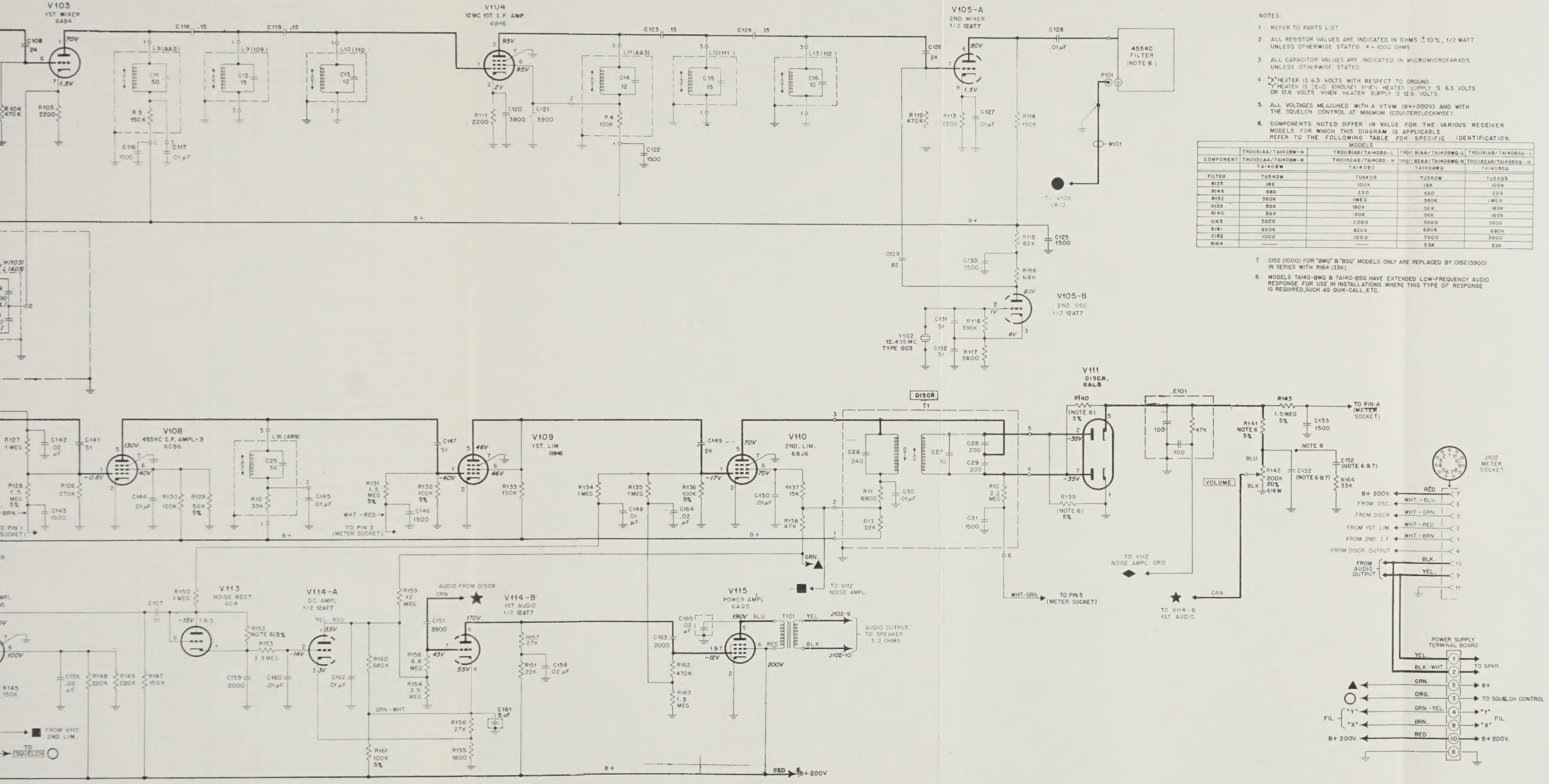


NOTES:

1. REFER TO PARTS LIST
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS ± 10%, 1/2 WATT UNLESS OTHERWISE STATED. K = 1000 OHMS
3. ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED.
4. "X" HEATER IS 6.3 VOLTS WITH RESPECT TO GROUND. "Y" HEATER IS ZERO (GROUND) WHEN HEATER SUPPLY IS 6.3 VOLTS OR 12.6 VOLTS WHEN HEATER SUPPLY IS 12.6 VOLTS.
5. ALL VOLTAGES MEASURED WITH A VTVM (B+=200V) AND WITH THE SQUELCH CONTROL AT MINIMUM (COUNTERCLOCKWISE)
6. COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.

COMPONENT	MODELS			
	TR0115IAA/TA1408W-H TR0115ZAA/TA1408W-H TA1408W	TR0115IAB/TA1408S-L TR0115ZAB/TA1408S-H TA1408S	TR011 8IAA/TA1408WQ-L TR011 82AA/TA1408WQ-H TA1408WQ	TR0118IAB/TA1408SQ-L TR01182AB/TA1408SQ-H TA1408SQ
FILTER	TU540W	TU540S	TU540W	TU540S
R125	18K	100K	18K	100K
R146	680	220	680	220
R152	560K	1MEG	560K	1MEG
R139	56K	180K	56K	180K
R140	56K	180K	56K	180K
C163	2000	2000	3900	3900
R141	820K	820K	680K	680K
C152	1000	1000	3900	3900
R164	———	———	33K	33K

7. C152 (1000) FOR "BWQ" & "BSQ" MODELS ONLY ARE REPLACED BY C152 (3900) IN SERIES WITH R164 (33K).
8. MODELS TA140-BWQ & TA140-BSQ HAVE EXTENDED LOW-FREQUENCY AUDIO RESPONSE FOR USE IN INSTALLATIONS WHERE THIS TYPE OF RESPONSE IS REQUIRED, SUCH AS QUIK-CALL, ETC.

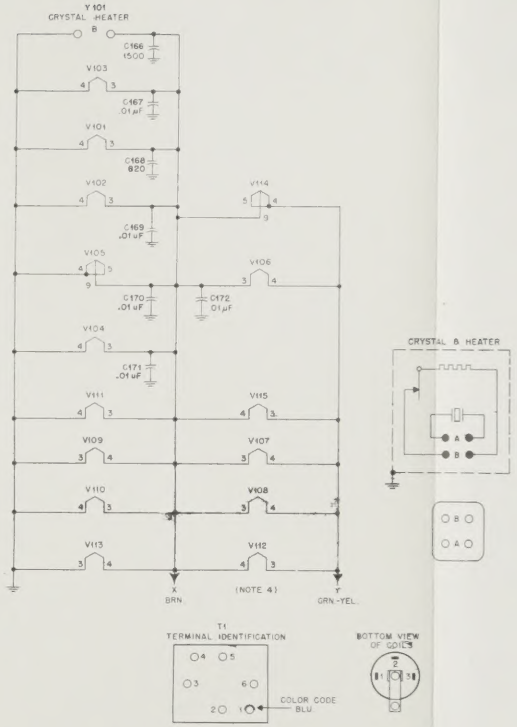


NOTES:

1. REFER TO PARTS LIST
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS ± 10%, 1/2 WATT UNLESS OTHERWISE STATED. K = 1000 OHMS
3. ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED.
4. "X" HEATER IS 6.3 VOLTS WITH RESPECT TO GROUND. "Y" HEATER IS ZERO (GROUND) WHEN HEATER SUPPLY IS 6.3 VOLTS OR 12.6 VOLTS WHEN HEATER SUPPLY IS 12.6 VOLTS.
5. ALL VOLTAGES MEASURED WITH A VTVM (B+=200V) AND WITH THE SQUELCH CONTROL AT MINIMUM (COUNTERCLOCKWISE)
6. COMPONENTS NOTED DIFFER IN VALUE FOR THE VARIOUS RECEIVER MODELS FOR WHICH THIS DIAGRAM IS APPLICABLE. REFER TO THE FOLLOWING TABLE FOR SPECIFIC IDENTIFICATION.

COMPONENT	MODELS			
	TRD1151AA/TA140BW-H	TRD1161AB/TA140BS-L	TRD1181AA/TA140BWQ-L	TRD1181AB/TA140BSQ-L
	TRD1152AA/TA140BW-H	TRD1152AB/TA140BS-H	TRD1182AA/TA140BWQ-H	TRD1182AB/TA140BSQ-H
	TA140BW	TA140BS	TA140BWQ	TA140BSQ
FILTER	TU540W	TU540S	TU540W	TU540S
R125	18K	100K	18K	100K
R146	680	220	680	220
R152	560K	1MEG	560K	1MEG
R139	56K	180K	56K	180K
R140	56K	180K	56K	180K
C163	2000	2000	3900	3900
R141	820K	820K	680K	680K
C152	1000	1000	3900	3900
R164	——	——	33K	33K

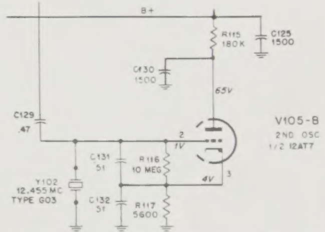
7. C152 (1000) FOR "BWQ" & "BSQ" MODELS ONLY ARE REPLACED BY C152 (3900) IN SERIES WITH R164 (33K).
8. MODELS TA140-BWQ & TA140-BSQ HAVE EXTENDED LOW-FREQUENCY AUDIO RESPONSE FOR USE IN INSTALLATIONS WHERE THIS TYPE OF RESPONSE IS REQUIRED, SUCH AS QUIK-CALL, ETC.



MODEL TABLE

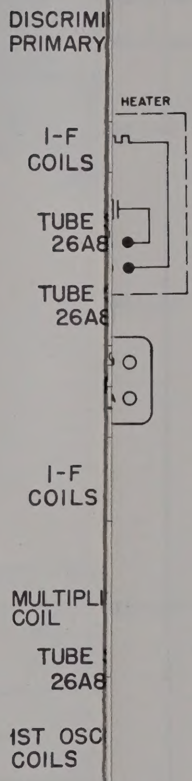
SERIES	MODEL	SUFFIX	CHANNEL SPACING	APPLICATION
TRD1150AA	TRD1151AA/TA140BW-L	9	60KC	MOBILE & SERVI-CAR
	TRD1152AA/TA140BW-H	9	60KC	MOBILE & SERVI-CAR
TRD1150AB	TRD1151AB/TA140BS-L	10	30KC	MOBILE & SERVI-CAR
	TRD1152AB/TA140BS-H	10	30KC	MOBILE & SERVI-CAR
TRD1180AA	TRD1181AA/TA140BWQ-L	7	60KC	(SEE NOTE 8)
	TRD1182AA/TA140BWQ-H	7	60KC	(SEE NOTE 8)
TRD1180AB	TRD1181AB/TA140BSQ-L	3	30KC	MOBILE & SERVI-CAR
	TRD1182AB/TA140BSQ-H	3	30KC	MOBILE & SERVI-CAR

REVISIONS

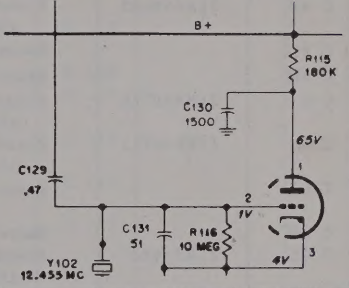
	DIAG ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
63E839287	L	TA140-BW-7 TA140-BX-7 TA140-BS-8 TA140-BWQ-5 TA140-BSQ-1 TA163-AW-5 TA163-AS TA163-AX-5 TRD1151AA/ TA140BW-L-8 TRD1152AA/ TA140BW-H-8 TA140-BX-8	R152	WAS 820K	V114-A GRID
	M	TRD1151AB/ TA140BS-L-9 TRD1152AB/ TA140BS-H-9 TRD1181AA/ TA140BWQ-L-6 TRD1182AA/ TA140BW-H-6 TRD1181AB/ TA140BSQ-L-2 TRD1182AB/ TA140BSQ-H-2 TA163-AW-6 TA163-AS-1 TA163-AX-6	R165	33K RESISTOR ADDED BETWEEN TERMINALS #1 AND #2 OF COIL L14 (BC6)	V107-1
	N	TRD1151AA/ TA140BW-L-9 TRD1152AA/ TA140BW-H-9 TRD1151AB/ TA140BS-L-10 TRD1152AB/ TA140BS-H-10	R115 R116 R166 C129	WAS 180K WAS 10 MEG ADDED (6.8K) RELOCATED AND WAS .47 UUF CIRCUIT WAS AS SHOWN BELOW  B+ R115 180K C125 1500 C130 1500 65V C129 .47 V105-B 2ND OSC 1/2 12AT7 2 1V C131 51 R116 10 MEG Y102 12.455 MC TYPE G03 4V 3 C132 51 R117 5600	2ND OSC.
63E862494	O			DIAGRAM NUMBER CHANGED. MODEL TA140BX AND TA163 MODEL SERIES DELETED.	

Receiver, Single-Frequency, 144-174 MC
Schematic Diagram
Motorola No. 63E862494-O
1/15/60-CP

AEPD-2004-A (CE1325A)



REVISIONS

	DIAG. ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
63E839288	L	TA140-BW-R2-8 TA140-BX-R2-8 TA140-BS-R2-9	R152	WAS 820K	V114A-2
	M	TRD1151AC/ TA140BW-R2-L-9 TRD1152AC/ TA140BW-R2-H-9 TRD1151AD/ TA140BS-R2-L-10 TRD1152AD/ TA140BS-R2-H-10 TA140BX-R2-9	R164	33K RESISTOR ADDED BETWEEN TERMINALS #1 AND #2 OF COIL L14 (BC6)	V107-1
	N	TRD1151AC/ TA140BW-R2-L-10 TRD1152AC/ TA140BW-R2-H-10 TRD1151AD/ TA140BS-R2-L-11 TRD1152AD/ TA140BS-R2-H-11 TA140BX-R2-10	C129 R115 R116 R165	RELOCATED AND WAS .47 UUF WAS 180K WAS 10 MEG ADDED (6.8K) CIRCUIT WAS AS SHOWN BELOW 	2ND OSC.
63E862493	O			DIAGRAM NUMBER CHANGED. MODEL TA140BX-R2 DELETED.	

Receiver, Two-Frequency, 144-174 MC
Schematic Diagram
Motorola No. 63E862493-O
1/15/60-CP

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63E862494-O

NOTE

When ordering replacement parts, specify part number, description, schematic diagram number, diagram issue and reference symbol of the part. The value of certain components included in the 1 to 99 series reference symbols will vary for different frequency ranges. Where such variations occur, the components are identified by the suffixes L and H following the reference symbol. Suffix "L" indicates the 144-152 MC range; "H" 152-174 MC.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 1L	21R490602	Fixed: ceramic; tubular; 10 uuf ±5%; 500 vdcw; p/o L 1L
C 1H	21R400072	Fixed: ceramic; tubular; 6 uuf ±.5 uuf; 500 vdcw; p/o L 1H
C 2L	21R114052	Fixed: ceramic; tubular; 56 uuf ±10%; 500 vdcw; p/o L 1L
C 2H	21R87127	Fixed: ceramic; tubular; 36 uuf ±5%; 500 vdcw; p/o L 1H
C 3L		Same as C 1L except p/o L 2L
C 3H	21R121918	Fixed: ceramic; tubular; 6 uuf ±.5 uuf; 500 vdcw; p/o L 2H
C 4L	21K836528	Fixed: ceramic; disc; 14 uuf ±5%; 500 vdcw; p/o L 3L
C 4H	21R490605	Fixed: ceramic; tubular; 12 uuf ±5%; 500 vdcw; p/o L 3H
C 5L		Same as C 1L except p/o L 4L
C 5H		Same as C 1H except p/o L 4H
C 6	21K840716	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw; p/o L 5
C 7	21K840711	Fixed: molded silver mica; 51 uuf ±5%; 500 vdcw; p/o L 5
C 8L		Same as C 1L except p/o L 6L
C 8H		Same as C 1L except p/o L 6H
C 9L	21R31492	Fixed: ceramic; tubular; 20 uuf ±5%; 500 vdcw; p/o L 7L
C 9H	21R119296	Fixed: ceramic; tubular; 16 uuf ±5%; 500 vdcw; p/o L 7H
C 10L		Same as C 2L except p/o L 7L
C 10H	21R114153	Fixed: ceramic; tubular; 47 uuf ±10%; 500 vdcw; p/o L 7H
C 11	21R474573	Fixed: ceramic; tubular; 50 uuf ±5%; 500 vdcw; p/o L 8
C 12	21R475262	Fixed: ceramic; tubular; 15 uuf ±5%; 500 vdcw; p/o L 9
C 13	21R475261	Fixed: ceramic; tubular; 12 uuf ±5%; 500 vdcw; p/o L 10
C 14		Same as C 13 except p/o L 11
C 15		Same as C 12 except p/o L 12
C 16	21R890124	Fixed: ceramic; tubular; 10 uuf ±5%; 500 vdcw; p/o L 13
C 23		Same as C 2H except p/o L 14
C 24		Same as C 2H except p/o L 15
C 25		Same as C 2H except p/o L 16
C 26	21K840048	Fixed: molded silver mica; 240 uuf ±5%; 500 vdcw; p/o T 1
C 27	21K840811	Fixed: ceramic; disc; 10 uuf ±5%; 500 vdcw; p/o T 1
C 28	21K840812	Fixed: molded silver mica; 200 uuf ±5%; 500 vdcw; p/o T 1
C 29		Same as C 28 except p/o T 1
		CAPACITORS,
C 30	21B801139	Fixed: ceramic; disc; .01 uf +80-20%; 600 vdcw; p/o T 1
C 31	21B800801	Fixed: ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw; p/o T 1
C 101	21K840365	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw
C 102	21B837745	Fixed: ceramic; disc; 820 uuf ±10%; 500 vdcw
C 103		Same as C 102
C 104		Same as C 102
C 105		Same as C 102
C 106	21K881064	Fixed: molded phenolic; tubular; .15 uuf ±5%; 500 vdcw
C 107		Same as C 106
C 108		Same as C 101
C 109		Same as C 102
C 110	20B840719	Variable: air; 8 uuf min. to 50 uuf max.
C 111	21K838284	Fixed: ceramic; disc; 3.9 uuf ±.25 uuf; 250 vdcw
C 112	21K837746	Fixed: ceramic; disc; 2000 uuf ±10%; 500 vdcw
C 113		Same as C 112
C 114		Same as C 112
C 115	21K830201	molded phenolic; tubular; .3 uuf ±5%; 500 vdcw
C 116		Same as C 31 except p/o Basic Chassis
C 117		Same as C 30 except p/o Basic Chassis
C 118		Same as C 106
C 119		Same as C 106
C 120	21K837996	Fixed: ceramic; disc; 3900 uuf ±10%; 500 vdcw
C 121		Same as C 120
C 122		Same as C 31 except p/o Basic Chassis
C 123		Same as C 106
C 124		Same as C 106
C 125		Same as C 31 except p/o Basic Chassis
C 126		Same as C 101
C 127		Same as C 30 except p/o Basic Chassis
C 128		Same as C 30 except p/o Basic Chassis
C 129	21K475679	Fixed: molded phenolic; tubular; .82 uuf ±10%; 500 vdcw
C 130		Same as C 31 except p/o Basic Chassis
C 131		Same as C 7 except p/o Basic Chassis
C 132		Same as C 7 except p/o Basic Chassis
C 133		NOT USED
C 134	8A892986	Fixed: oil filled; tubular; .25 uf ±20%; 400 vdcw
C 135		Same as C 30 except p/o Basic Chassis
C 136		Same as C 30 except p/o Basic Chassis
C 137		Same as C 30 except p/o Basic Chassis
C 138		Same as C 7 except p/o Basic Chassis
C 139		Same as C 30 except p/o Basic Chassis
C 140		Same as C 30 except p/o Basic Chassis
C 141		Same as C 7 except p/o Basic Chassis
C 142	21B401029	Fixed: ceramic; disc; .02 uf +80-20%; 600 vdcw
C 143		Same as C 31 except p/o Basic Chassis
		CAPACITORS,
C 144		Same as C 30 except p/o Basic Chas.
C 145		Same as C 30 except p/o Basic Chas.
C 146		Same as C 31 except p/o Basic Chas.
C 147		Same as C 7 except p/o Basic Chas.
C 148		Same as C 30 except p/o Basic Chas.
C 149		Same as C 101
C 150		Same as C 30 except p/o Basic Chas.
C 151		Same as C 120
C 152	21K847601	Fixed: molded silver mica; 1000 uuf ±5%; 500 vdcw; 60 KC models only
C152S	21K837996	Fixed: ceramic; disc; 3900 uuf ±10%; 500 vdcw; 30 KC models only
C 153		Same as C 31 except p/o Basic Chas.
C 154		Same as C 151
C 155		Same as C 30 except p/o Basic Chas.
C 156		Same as C 142
C 157		Same as C 7 except p/o Basic Chas.
C 158		Same as C 142
C 159		Same as C 112
C 160		Same as C 30 except p/o Basic Chas.
C 161	23K890624	Fixed: electrolytic; tubular; 5 uf +100-15%; 150 vdcw
C 162		Same as C 30 except p/o Basic Chas.
C 163	21K837746	Fixed: ceramic; disc; 2000 uuf ±10%; 500 vdcw; 60 KC models only
C163S	21K837996	Fixed: ceramic; disc; 3900 uuf ±10%; 500 vdcw; 30 KC models only
C 164		Same as C 142
C 165	8K85984	Fixed: oil filled; tubular; .02 uf ±20%; 400 vdcw
C 166		Same as C 31 except p/o Basic Chassis
C 167		Same as C 30 except p/o Basic Chassis
C 168		Same as C 102
C 169		Same as C 30 except p/o Basic Chassis
C 170		Same as C 30 except p/o Basic Chassis
C 171		Same as C 30 except p/o Basic Chassis
C 172		Same as C 30 except p/o Basic Chassis
		CAPACITOR-RESISTOR ASSEMBLY,
E 101	21K842354	Tubular; consisting of: Dual CAPACITOR; printed circuit, silver paint on ceramic form; each section 100 uuf; 300 vdcw One RESISTOR; fixed; carbon 47K ±20%
		CONNECTORS,
J 101	9A87120	Receptacle: female; single contact; round molded mica filled phenolic base; for 1/8" diameter male pin connector
J 102	9B86864	Receptacle: female; 11 contact; polarized; round molded black plastic base; chassis mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately
		CONNECTORS,
		mounting; used only in TA163 Series Models
		COILS,
L 1L	24K836515	RF: Antenna; base stamped AD4; includes 76A824120 CORE, adjustable tuning
L 1H	24B824102	RF: Antenna; base stamped 102; includes 76A824120 CORE, adjustable tuning
L 2L	24K836518	RF: Plate; base stamped AD7; includes 76A824120 CORE, adjustable tuning
L 2H	24B824104	RF: Plate; base stamped 104; includes 76A824120 CORE, adjustable tuning
L 3L	24K836519	RF: Coupling; base stamped AD8; includes 76A824120 CORE, adjustable tuning
L 3H	24B824106	RF: Coupling; base stamped 106; includes 76A824120 CORE, adjustable tuning
L 4L	24K836520	RF: Mixer Grid; base stamped AD9; includes 76A824120 CORE, adjustable tuning
L 4H	24K824107	RF: Mixer Grid; base stamped 107; includes 76A824120 CORE, adjustable tuning
L 5	24B840709	RF: 1st Oscillator; base stamped AR7; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 6L	24K824105	RF: 1st Multiplier; base stamped 105; includes 76A824120 CORE, adjustable tuning and reference parts C8, R2
L 6H		Same as L 6L
L 7L	24K836516	RF: Injection; base stamped AD5; includes 76A824120 CORE, adjustable tuning
L 7H	24K824103	RF: Injection; base stamped 103; includes 76A824120 CORE, adjustable tuning
L 8	24K834778	IF: 12 mc IF - 1; base stamped AA2; includes 76A824118 CORE, adjustable tuning
L 9	24B824109	IF: 12 mc IF-2 base stamped 109; includes 76A824118 CORE, adjustable tuning
L 10	24B824110	IF: 12 mc IF - 3; base stamped 110; includes 76A824118 CORE, adjustable tuning
L 11	24K834779	IF: 12 mc IF - 4; base stamped AA3; includes 76A824118 CORE, adjustable tuning
L 12	24K824111	IF: 12 mc IF - 5; base stamped 111; includes 76A824118 CORE, adjustable tuning
L 13	24K824112	IF: 12 mc IF - 6; base stamped 112; includes 76A824118 CORE, adjustable tuning
L 14	24K854048	IF: 2nd IF - 1; base stamped BC6; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C23, R8
L 15		Same as L 14 except 2nd IF - 2 inc. reference parts C24, R9
L 16		Same as L 14 except 2nd IF - 3
L 101	24A840728	RF: choke; 4 microhenries;
		COILS,
		coded WHT-BLU dot
L 102	24B840042	RF: choke; 1 microhenry coded RED-BLK dot
L 103	24K840559	RF: choke; 1.2 microhenries; coded BLK-GRN dot
		CONNECTOR, plug: male;
P 101	28K849416	single contact; round brown bakelite insulator; cable mounted
		RESISTORS,
R 1	6R6394	Fixed: carbon; 12K ±10%; 1/2 w; ins.; p/o L 2
R 2	6R5591	Fixed: carbon; 18K ±10%; 1/2 w; ins.; p/o L 6
R 3	6R6398	Fixed: carbon; 150K ±10%; 1/2 w; ins.; p/o L 8
R 4	6R6031	Fixed: carbon; 100K ±10%; 1/2 w; ins.; p/o L 11
R 5		NOT USED
R 6		NOT USED
R 7		NOT USED
R 8	6R6074	Fixed: carbon; 68K ±10%; 1/2 w; ins.; 2 req'd; p/o L 14
R 9		Same as R 8 except p/o L 15
R 10	6R6410	Fixed: carbon; 33K ±10%; 1/2 w; ins.
R 11	6R6428	Fixed: carbon; 6.8K ±10%; 1/2 w; ins.; p/o T 1
R 12	6R6433	Fixed: carbon; 2.2 megohm ±10%; 1/2 w; ins.; p/o T 1
R 13	6R6397	Fixed: carbon; 22K ±10%; 1/2 w; ins.; p/o T 1
R 101	6R5553	Same as R4
R 102	6R6446	Fixed: carbon; 4.7 megohm ±10%; 1/2 w; ins.
R 103		Same as R4
R 104	6R6377	Fixed: carbon; 470K ±10%; 1/2 w; ins.
R 105	6R6069	Fixed: carbon; 2.2K ±10%; 1/2 w; ins.
R 106	6R400490	Fixed: carbon; 8.2K ±5%; 1/2 w; ins.
R 107	6R400066	Fixed: carbon; 220K ±5%; 1/2 w; ins.
R 108	6R2075	Fixed: carbon; 12K ±5%; 1/2 w; ins.
R 109	6R6048	Fixed: carbon; 47K ±10%; 1/2 w; ins.
R 110	6R6479	Fixed: carbon; 68K ±5%; 1/2 w; ins.
R 111		Same as R 105
R 112		Same as R 104
R 113		Same as R 105
R 114		Same as R 3 except p/o Basic Chassis
R 115	6R5644	Fixed: carbon; 82K ±10%; 1/2 w; ins.
R 116	6R5646	Fixed: carbon; 390K ±10%; 1/2 w; ins.
R 117	6R6117	Fixed: carbon; 5.6K ±10%; 1/2 w; ins.
R 118	6R6326	Fixed: carbon; 100 ohm ±10%; 1/2 w; ins.
R 119	6R5553	Fixed: carbon; 100K ±5%; 1/2 w; ins.
R 120	6R6270	Fixed: carbon; 220 ohm ±10%; 1/2 w; ins.
R 121		same as R115
R 122	6R5585	Fixed: carbon; 8.2 megohm ±10%; 1/2 w; ins.
		RESISTORS, (cont'd)
R 123		Same as R119
R 124		Same as R 3 except p/o Basic Chassis
R 125	6R488095	Fixed: carbon; 18K ±5%; 1/2 w; ins.; 60 KC models only
R 125S	6R5553	Fixed: carbon; 100K ±5%; 1/2 w. ins.; 30 KC models only
R 126	6R6414	Fixed: carbon; 270K ±10%; 1/2 w; ins.
R 127	6R6046	Fixed: carbon; 1 megohm ±10%; 1/2 w; ins.
R 128	6R400228	Fixed: carbon; 1.5 megohm ±5%; 1/2 w; ins.
R 129	6R401006	Fixed: carbon; 56K ±5%; 1/2 w; ins.
R 130	6R5631	Fixed: carbon; 120K ±10%; 1/2 w; ins.
R 131		Same as R 128
R 132		Same as R 119
R 133		Same as R 3 except p/o Basic Chas.
R 134		Same as R 127
R 135		Same as R 127
R 136		Same as R 119
R 137	6R6477	Fixed: carbon; 15K ±10%; 1/2 w; ins.
R 138		Same as R 109
R 139	6R401006	Fixed: carbon; 56K ±5%; 1/2 w; ins. 60 KC models only
R 139S	6R2061	Fixed: carbon; 180K ±5%; 1/2 w; ins.; 30 KC models only
R 140		Same as R 139
R 140S		Same as R 139S
R 141	6R5773	Fixed: carbon; 820K ±5%; 1/2 w; ins.; std. audio freq. range models only.
	or 6R6475	Fixed: carbon; 680K ±10%; 1/2 w; ins. extended audio freq. range models only
R 142	18K845110	Variable: carbon; 200K ±20%; 1/4 w
R 143		Same as R 128
R 144	6R5772	Fixed: carbon; 47K ±5%; 1/2 w; ins.
R 145		Same as R 3 except p/o Basic Chas.
R 146	6R6040	Fixed: carbon; 680 ohm ±10%; 1/2 w; ins.; 60 KC models only
R 146S	6R6270	Fixed: carbon; 220 ohm ±10%; 1/2 w; ins.; 30 KC models only
R 147		Same as R 3 except p/o Basic Chas.
R 148	6R6407	Fixed: carbon; 220K ±10%; 1/2 w; ins.
R 149		Same as R 148
R 150		Same as R 127
R 151		Same as R 13 except p/o Basic Chas.
R 152	6R5796	Fixed: carbon; 560K ±5%; 1/2 w; ins.; 60 KC models only
R 152S	6R5587	Fixed: carbon; 1 megohm ±5%; 1/2 w; ins.; 30 KC models only
R 153	6R6497	Fixed: carbon; 3.3 megohm ±10%; 1/2 w; ins.
R 154	6R490110	Fixed: carbon; 3.9 megohm ±10%; 1/2 w; ins.
		RESISTORS, (cont'd)
R 155	6R2089	Fixed: carbon; 1.8K ±10%; 1/2 w; ins.
R 156	6R6434	Fixed: carbon 27K ±10%; 1/2 w; ins.
R 157		Same as R 156
R 158	6R2097	Fixed: carbon; 6.8 megohm ±10%; 1/2 w; ins.
R 159	6R400334	Fixed: carbon; 12 megohm ±10%; 1/2 w; ins.
R 160	6R6475	Fixed: carbon 680K ±10%; 1/2 w; ins.
R161		Same as R119
R162		Same as R104
R163		Same as R128
R164	6R6410	Fixed: carbon; 33K ±10%; 1/2 w; ins; extended audio freq. range models only.
R165		Same as R10
R166		Same as R11
		TRANSFORMERS,
T 1	1V842353	Discriminator: base coded BLUE dot; includes two 76A821495 CORE, adjustable tuning; coded YELLOW dot
T 101	25K847479	AF: output; 5000 ohm to 3.2 ohm at 55 ma. dc
		TUBES,
V 101	195T170A01	Type 6AK5
V 102	195T225A01	Type 6CE5/6BC5
V 103	195T212A01	Type 6AB4
V 104	195T175A01	Type 6BH6
V 105	195T113A02	Type 12AT7
V 106	195T147A03	Type 6CB6
V 107		Same as V106
V 108		Same as V106
V 109		Same as V104
V 110	195T176A01	Type 6BJ6
V 111	195T111A03	Type 6AL5
V 112		Same as V104
V 113	195T179A01	Type 6C4
V 114		Same as V105
V 115	195T101A01	Type 6AQ5
		LINE, RF transmission:
W101	1V857900	assembly; includes: 30B849414 CABLE, RF: coaxial: RG-58A/U; 4" length required; includes reference part P101
		SOCKETS,
XV 101	9B834083	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 102		Same as XV 101
XV 103	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield
XV 104		Same as XV 103
XV 105	9B881243	Tube: female; 9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 106		Same as XV 101
		SOCKETS, (cont'd)
XV 107	9B87123	Tube: female; 7 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 108		Same as XV 107
XV 109		Same as XV 107
XV 110		Same as XV 107
XV 111		Same as XV 107
XV 112		Same as XV 107
XV 113		Same as XV 107
XV 114	9B86868	Tube: female; 9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 115		Same as XV 107
		SOCKETS,
XY 101	9K857508	Crystal: female; 4 contact; square molded black bakelite base; chassis mounted
XY 102	9K861367	Crystal: female; 2 contact; rectangular; black phenolic base; chassis mounted

FILTER

		TU540S "PERMAKAY" IF Filter; 30 KC Channel Spacing TU540W "PERMAKAY" IF Filter; 60 KC Channel Spacing

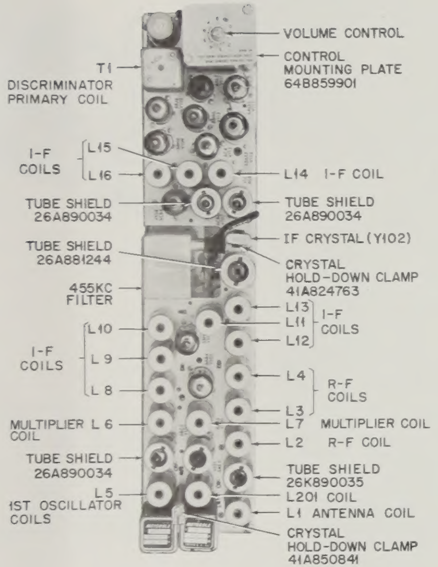
CRYSTAL

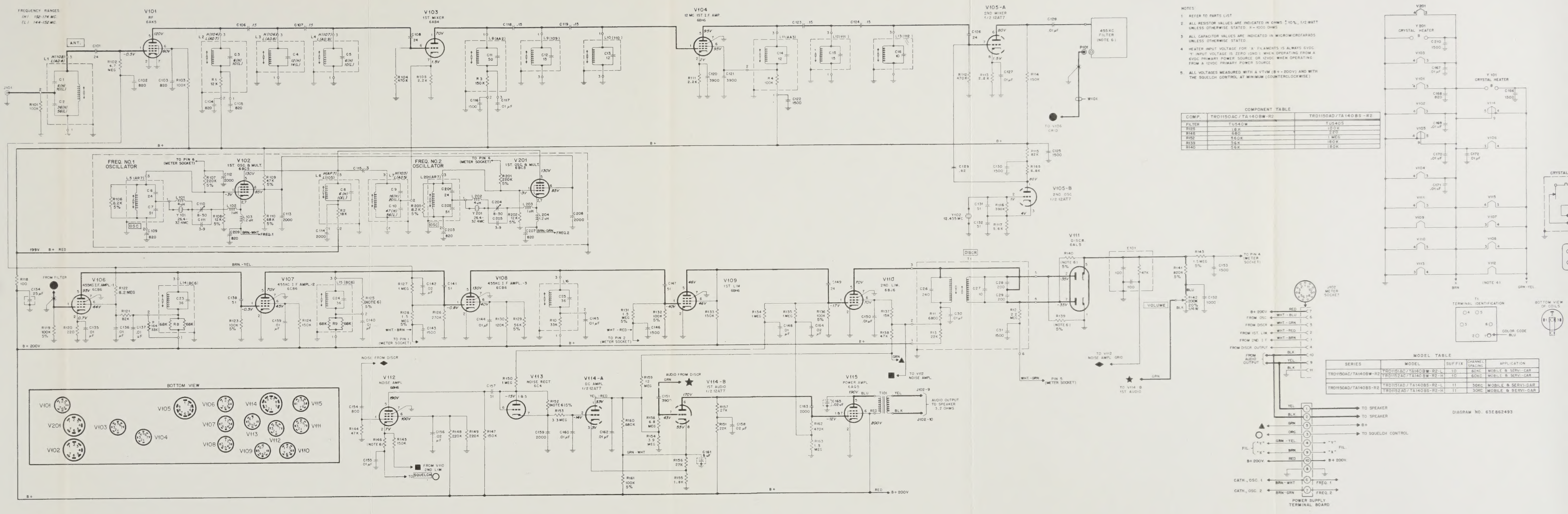
NOTE

Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

		CRYSTAL UNITS,
Y101	Type DM10/ RM10	Quartz: Receiver Control Oscillator; 26.4-32.4 mc; with 6 volt heater unit
Y102	Type GO3	Quartz: Receiver IF Oscillator; 12.455 mc

AEPD-2004-A (CE1325A)





NOTES

1. REFER TO PARTS LIST
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS ±10%, 1/2 WATT UNLESS OTHERWISE STATED. K = 1000 OHMS
3. ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED
4. HEATER INPUT VOLTAGE FOR 'X' FILAMENTS IS ALWAYS 6VDC. 'Y' INPUT VOLTAGE IS ZERO (GND) WHEN OPERATING FROM A 6VDC PRIMARY POWER SOURCE OR 12VDC WHEN OPERATING FROM A 12VDC PRIMARY POWER SOURCE
5. ALL VOLTAGES MEASURED WITH A VTVM (B+ = 200V) AND WITH THE SQUELCH CONTROL AT MINIMUM (COUNTERCLOCKWISE)

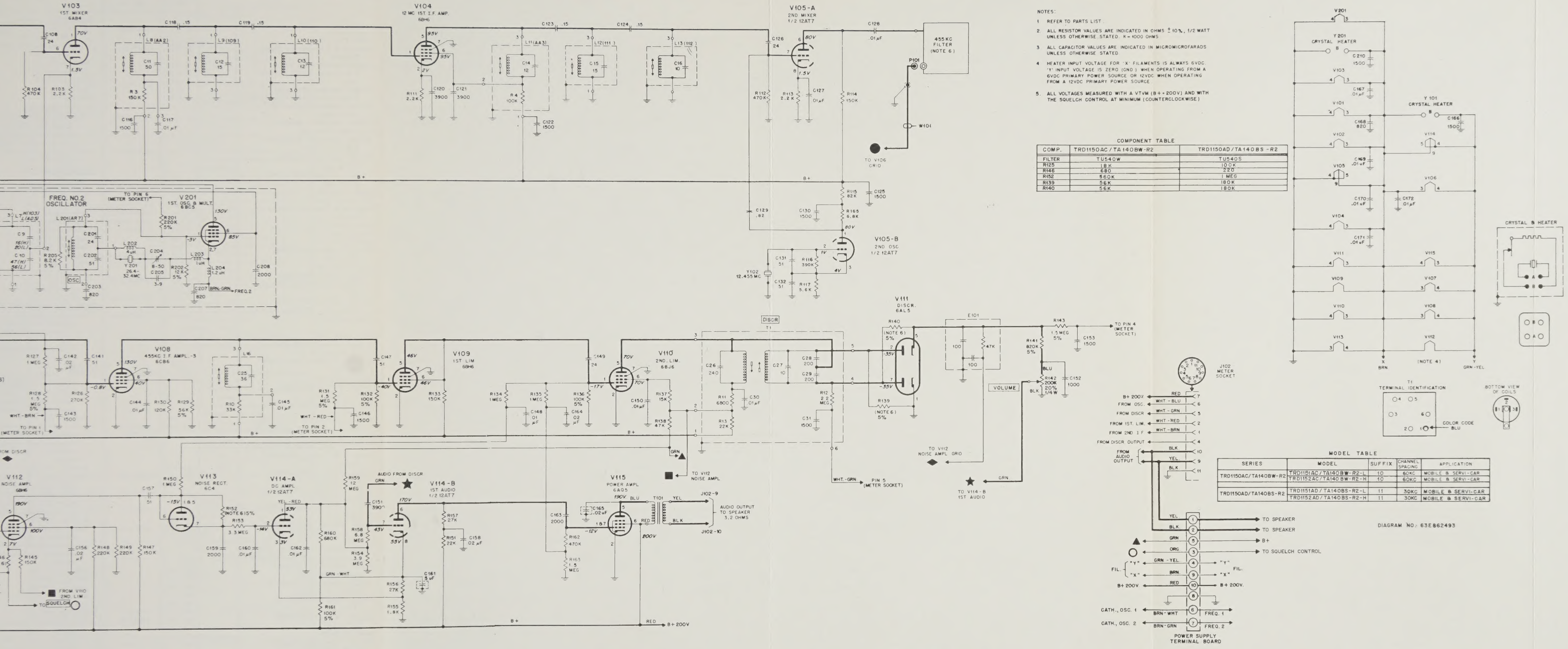
COMPONENT TABLE

COMP.	TRD1150AC/TA140BW-R2	TRD1150AD/TA140BS-R2
FILTER	TU540W	TU540S
R125	18K	100K
R146	680	220
R152	560K	1 MEG
R139	56K	180K
R140	56K	180K

MODEL TABLE

SERIES	MODEL	SUFFIX	CHANNEL SPACING	APPLICATION
TRD1150AC/TA140BW-R2	TRD1151AC/TA140BW-R2-L	10	60KC	MOBILE & SERVI-CAR
	TRD1152AC/TA140BW-R2-H	10	60KC	MOBILE & SERVI-CAR
TRD1150AD/TA140BS-R2	TRD1151AD/TA140BS-R2-L	11	30KC	MOBILE & SERVI-CAR
	TRD1152AD/TA140BS-R2-H	11	30KC	MOBILE & SERVI-CAR

DIAGRAM NO. 63E862493



NOTES:

1. REFER TO PARTS LIST.
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS ± 10%, 1/2 WATT UNLESS OTHERWISE STATED. K = 1000 OHMS
3. ALL CAPACITOR VALUES ARE INDICATED IN MICROMICROFARADS UNLESS OTHERWISE STATED.
4. HEATER INPUT VOLTAGE FOR 'X' FILAMENTS IS ALWAYS 6VDC. 'Y' INPUT VOLTAGE IS ZERO (GND.) WHEN OPERATING FROM A 6VDC PRIMARY POWER SOURCE OR 12VDC WHEN OPERATING FROM A 12VDC PRIMARY POWER SOURCE.
5. ALL VOLTAGES MEASURED WITH A VTVM (B+ = 200V) AND WITH THE SQUELCH CONTROL AT MINIMUM (COUNTERCLOCKWISE)

COMPONENT TABLE

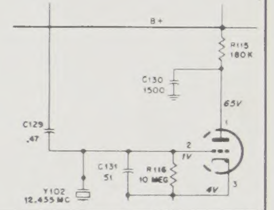
COMP.	TRD1150AC/TA140BW-R2	TRD1150AD/TA140BS-R2
FILTER	TU540W	TU540S
R125	18K	100K
R146	680	220
R152	560K	1 MEG
R139	56K	180K
R140	56K	180K

MODEL TABLE

SERIES	MODEL	SUFFIX	CHANNEL SPACING	APPLICATION
TRD1150AC/TA140BW-R2	TRD1151AC/TA140BW-R2-L	10	60KC	MOBILE & SERVI-CAR
	TRD1152AC/TA140BW-R2-H	10	60KC	MOBILE & SERVI-CAR
TRD1150AD/TA140BS-R2	TRD1151AD/TA140BS-R2-L	11	30KC	MOBILE & SERVI-CAR
	TRD1152AD/TA140BS-R2-H	11	30KC	MOBILE & SERVI-CAR

DIAGRAM NO: 63E862493

REVISIONS

	DIAG ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
63E839288	L	TA140-BW-R2-8 TA140-BX-R2-8 TA140-BS-R2-9	R152	WAS 820K	V114A-2
	M	TRD1151AC/ TA140BW-R2-L-9 TRD1152AC/ TA140BW-R2-H-9 TRD1151AD/ TA140BS-R2-L-10 TRD1152AD/ TA140BS-R2-H-10 TA140BX-R2-9	R164	33K RESISTOR ADDED BETWEEN TERMINALS #1 AND #2 OF COIL L14 (BC6)	V107-1
	N	TRD1151AC/ TA140BW-R2-L-10 TRD1152AC/ TA140BW-R2-H-10 TRD1151AD/ TA140BS-R2-L-11 TRD1152AD/ TA140BS-R2-H-11 TA140BX-R2-10	C129 R115 R116 R165	RELOCATED AND WAS .47 UUF WAS 180K WAS 10 MEG ADDED (6.8K) CIRCUIT WAS AS SHOWN BELOW  B+ R115 180K C130 1500 65V C129 .47 C131 51 R116 10 MEG Y102 12.455 MC 1V 4V	2ND OSC.
63E862493	O			DIAGRAM NUMBER CHANGED. MODEL TA140BX-R2 DELETED.	

Receiver, Two-Frequency, 144-174 MC
Schematic Diagram
Motorola No. 63E862493-O
1/15/60-CP

MOTOROLA PART No.	DESCRIPTION
	SOCKETS,
9B834083	Tube: female; 7 contact; miniature molded mica filled phenolic base; saddle mounting includes center shield and tube shield base
9K857508	Crystal: female; 4 contact; square; molded black bakelite base; chassis mounted

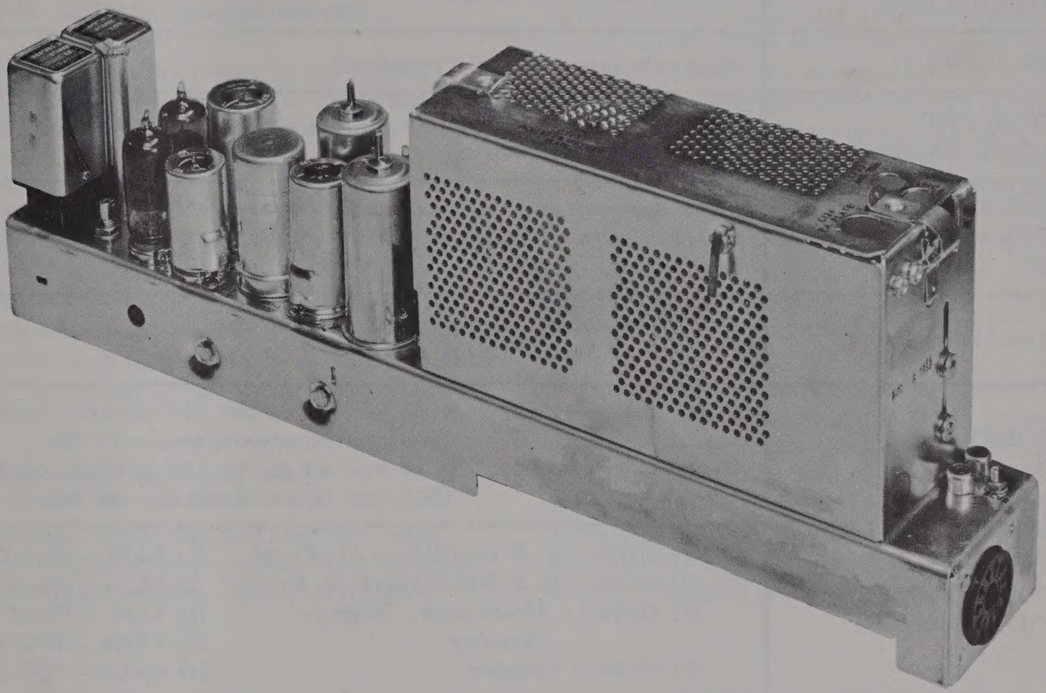
	TU540S "PERMAKAY" IF Filter; 30 KC Channel Spacing TU540W "PERMAKAY" IF Filter; 60 KC Channel Spacing

NOTE

Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

	CRYSTAL UNITS,
Type DM10/ RM10	Quartz: Receiver Control Oscillator; 26.4-32.4 MC; with 6 volt heater unit
Type GO3	Quartz: Receiver IF Oscillator; 12.455 MC
	Same as Y 101

TRANSMITTER



MODEL CHART

MODEL NUMBER	NO. OF FREQS.	CRYSTALS REQUIRED
TTD1000AA	ONE	ONE RN1
TTD1000AB	TWO	TWO RN1

1. DESCRIPTION

The transmitters listed in the model chart are FM transmitters which operate on crystal-controlled frequencies within the 144-174 mc band. A separate power supply provides the transmitter operating voltages to produce and r-f power output of 10 or 25 watts depending on the output of the power supply used.

The single-frequency transmitter consists of a crystal-controlled oscillator, an angular phase modulator, four stages of frequency multiplication and a final amplifier stage. The fundamental crystal frequency is multiplied 24 times to provide the final r-f amplifier output frequency.

The two-frequency transmitter is the same as the single frequency model except that a second crystal oscillator, with control crystal, is used. Transmissions are made on two specific crystal-controlled frequencies in the 144-174 mc band. Only one frequency can be transmitted at a time. An external switch is required for changing frequencies and is ordinarily incorporated into the control unit used with the transmitter. This switch causes the desired oscillator to function by grounding its cathode.

MOTOROLA INC. COMMUNICATIONS DIVISION
Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63E862493-O

NOTE

Components unique for two-frequency are itemized at the end of this parts list.

When ordering replacement parts, specify part number, description, schematic diagram number, diagram issue and reference symbol of the part. The value of certain components included in the 1 to 99 series reference symbols will vary for different frequency ranges. Where such variations occur, the components are identified by the suffixes L and H following the reference symbol. Suffix "L" indicates the 144-152 mc. range; "H" indicates the 152-174 mc. range.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 1L	21R490602	Fixed: ceramic; tubular; 10 uuf ±5%; 500 vdcw; p/o L 1L
C 1H	21R400072	Fixed: ceramic; tubular; 6 uuf ±.5 uuf; 500 vdcw; p/o L 1H
C 2L	21R114052	Fixed: ceramic; tubular; 56 uuf ±10%; 500 vdcw; p/o L 1L
C 2H	21R87127	Fixed: ceramic; tubular; 36 uuf ±5%; 500 vdcw; p/o L 1H
C 3L		Same as C 1L except p/o L 2L
C 3H	21R121918	Fixed: ceramic; tubular; 6 uuf ±.5 uuf; 500 vdcw; p/o L 2H
C 4L	21K836528	Fixed: ceramic; disc; 14 uuf ±5%; 500 vdcw; p/o L 3L
C 4H	21R490605	Fixed: ceramic; tubular; 12 uuf ±5%; 500 vdcw; p/o L 3H
C 5L		Same as C 1L except p/o L 4L
C 5H		Same as C 1H except p/o L 4H
C 6	21K840716	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw; p/o L 5
C 7	21K840711	Fixed: molded silver mica; 51 uuf ±5%; 500 vdcw; p/o L 5
C 8L		Same as C 1L except p/o L 6L
C 8H		Same as C 1L except p/o L 6H
C 9L	21R31492	Fixed: ceramic; tubular; 20 uuf ±5%; 500 vdcw; p/o L 7L
C 9H	21R119296	Fixed: ceramic; tubular; 16 uuf ±5%; 500 vdcw; p/o L 7H
C 10L		Same as C 2L except p/o L 7L
C 10H	21R114153	Fixed: ceramic; tubular; 47 uuf ±10%; 500 vdcw; p/o L 7H
C 11	21R474573	Fixed: ceramic; tubular; 50 uuf ±5%; 500 vdcw; p/o L 8
C 12	21R475262	Fixed: ceramic; tubular; 15 uuf ±5%; 500 vdcw; p/o L 9
C 13	21R475261	Fixed: ceramic; tubular; 12 uuf ±5%; 500 vdcw; p/o L 10
C 14		Same as C 13 except p/o L 11
C 15		Same as C 12 except p/o L 12
C 16	21R890124	Fixed: ceramic; tubular; 10 uuf ±5%; 500 vdcw; p/o L 13
C 23		Same as C 2H except p/o L 14
C 24		Same as C 2H except p/o L 15
C 25		Same as C 2H except p/o L 16
C 26	21K840048	Fixed: molded silver mica; 240 uuf ±5%; 500 vdcw; p/o T 1
C 27	21K840811	Fixed: ceramic; disc; 10 uuf ±5%; 500 vdcw; p/o T 1
C 28	21K840812	Fixed: molded silver mica; 200 uuf ±5%; 500 vdcw; p/o T 1
C 29		Same as C 28 except p/o T 1

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 30	21B801139	Fixed: ceramic; disc; .01 uf +80-20%; 600 vdcw; p/o T 1
C 31	21B800801	Fixed: ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw; p/o T 1
C 101	21K840365	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw
C 102	21B837745	Fixed: ceramic; disc; 820 uuf ±10%; 500 vdcw
C 103		Same as C 102
C 104		Same as C 102
C 105		Same as C 102
C 106	21K881064	Fixed: molded phenolic; tubular; 15 uuf ±5%; 500 vdcw
C 107		Same as C 106
C 108		Same as C 101
C 109		Same as C 102
C 110	20B840719	Variable: air; 8 uuf min. to 50 uuf max.
C 111	21K838284	Fixed: ceramic; disc; 3.9 uuf ±.25 uuf; 250 vdcw
C 112	21K837746	Fixed: ceramic; disc; 2000 uuf ±10%, 500 vdcw
C 113		Same as C 112
C 114		Same as C 112
C 115	21K830201	molded phenolic; tubular; .3 uuf ±5%; 500 vdcw
C 116		Same as C 31 except p/o Basic Chassis
C 117		Same as C 30 except p/o Basic Chassis
C 118		Same as C 106
C 119		Same as C 106
C 120	21K837996	Fixed: ceramic; disc; 3900 uuf ±10%; 500 vdcw
C 121		Same as C 120
C 122		Same as C 31 except p/o Basic Chassis
C 123		Same as C 106
C 124		Same as C 106
C 125		Same as C 31 except p/o Basic Chassis
C 126		Same as C 101
C 127		Same as C 30 except p/o Basic Chassis
C 128		Same as C 30 except p/o Basic Chassis
C 129	21K475679	Fixed: molded phenolic; tubular, .82 uuf ±10%; 500 vdcw
C 130		Same as C 31 except p/o Basic Chassis
C 131		Same as C 7 except p/o Basic Chassis
C 132		Same as C 7 except p/o Basic Chassis
C 133		NOT USED
C 134	8A892986	Fixed: oil filled; tubular; .25 uf ±20%; 400 vdcw
C 135		Same as C 30 except p/o Basic Chassis
C 136		Same as C 30 except p/o Basic Chassis
C 137		Same as C 30 except p/o Basic Chassis
C 138		Same as C 7 except p/o Basic Chassis
C 139		Same as C 30 except p/o Basic Chassis
C 140		Same as C 30 except p/o Basic Chassis
C 141		Same as C 7 except p/o Basic Chassis
C 142	21B401029	Fixed: ceramic; disc; .02 uf +80-20%; 600 vdcw
C 143		Same as C 31 except p/o Basic Chassis

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 144		Same as C 30 except p/o Basic Chassis
C 145		Same as C 30 except p/o Basic Chassis
C 146		Same as C 31 except p/o Basic Chassis
C 147		Same as C 7 except p/o Basic Chassis
C 148		Same as C 30 except p/o Basic Chassis
C 149		Same as C 101
C 150		Same as C 30 except p/o Basic Chassis
C 151		Same as C 120
C 152	21K847601	Fixed: molded silver mica; 1000 uuf ±5%; 500 vdcw
C 153		Same as C 31 except p/o Basic Chassis
C 154	21K840049	Fixed: molded sil. mica; phenolic coated; 800 uuf ±5%; 300 vdcw
C 155		Same as C 30 except p/o Basic Chassis
C 156		Same as C 142
C 157		Same as C 7 except p/o Basic Chassis
C 158		Same as C 142
C 159		Same as C 112
C 160		Same as C 30 except p/o Basic Chassis
C 161	23K890624	Fixed: electrolytic; tubular; 5 uf +100-15%, 150 vdcw
C 162		Same as C 30 except p/o Basic Chassis
C 163		Same as C 112
C 164		Same as C 142
C 165	8K85984	Fixed: oil filled; tubular; .02 uf ±20%; 400 vdcw
C 166		Same as C 31 except p/o Basic Chassis
C 167		Same as C 30 except p/o Basic Chassis
C 168		Same as C 102
C 169		Same as C 30 except p/o Basic Chassis
C 170		Same as C 30 except p/o Basic Chassis
C 171		Same as C 30 except p/o Basic Chassis
C 172		Same as C 30 except p/o Basic Chassis
		CAPACITOR-RESISTOR ASSEMBLY,
E 101	21K842354	Tubular; consisting of: Dual CAPACITOR; printed circuit, silver paint on ceramic form; each section 100 uuf; 300 vdcw One RESISTOR; fixed; carbon 47K ±20%
		CONNECTORS,
J 101	9A87120	Receptacle: female; single contact; round molded mica filled phenolic base; for 1/8" diameter male pin connector
J 102	9B86864	Receptacle: female; 11 contact; polarized; round molded black plastic base; chassis mounted; does not include 42A821428 RING, connector retainer; which must be ordered separately

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		COILS,
L 1L	24K836515	RF: Antenna; base stamped AD4; includes 76A824120 CORE, adjustable tuning
L 1H	24B824102	RF: Antenna; base stamped 102; includes 76A824120 CORE, adjustable tuning
L 2L	24K836518	RF: Plate; base stamped AD7; includes 76A824120 CORE, adjustable tuning
L 2H	24B824104	RF: Plate; base stamped 104; includes 76A824120 CORE, adjustable tuning
L 3L	24K836519	RF: Coupling; base stamped AD8; includes 76A824120 CORE, adjustable tuning
L 3H	24B824106	RF: Coupling; base stamped 106; includes 76A824120 CORE, adjustable tuning
L 4L	24K836520	RF: Mixer Grid; base stamped AD9; includes 76A824120 CORE, adjustable tuning
L 4H	24K824107	RF: Mixer Grid; base stamped 107; includes 76A824120 CORE, adjustable tuning
L 5	24B840709	RF: 1st Oscillator; base stamped AR7; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 6L	24K824105	RF: 1st Multiplier; base stamped 105; includes 76A824120 CORE, adjustable tuning and reference parts C8, R2
L 6H		Same as L 6L
L 7L	24K836516	RF: Injection; base stamped AD5; includes 76A824120 CORE, adjustable tuning
L 7H	24K824103	RF: Injection; base stamped 103; includes 76A824120 CORE, adjustable tuning
L 8	24K834778	IF: 12 mc IF - 1; base stamped AA2; includes 76A824118 CORE, adjustable tuning
L 9	24B824109	IF: 12 mc IF-2 base stamped 109; includes 76A824118 CORE, adjustable tuning
L 10	24B824110	IF: 12 mc IF - 3; base stamped 110; includes 76A824118 CORE, adjustable tuning
L 11	24K834779	IF: 12 mc IF - 4; base stamped AA3; includes 76A824118 CORE, adjustable tuning
L 12	24K824111	IF: 12 mc IF - 5; base stamped 111; includes 76A824118 CORE, adjustable tuning
L 13	24K824112	IF: 12 mc IF - 6; base stamped 112; includes 76A824118 CORE, adjustable tuning
L 14	24K854048	IF: 2nd IF - 1; base stamped BC6; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C23, R8
L 15		Same as L 14 except 2nd IF - 2 inc. reference parts C24 R9
L 16		Same as L 14 except 2nd IF - 3
L 101	24A840728	RF: choke; 4 microhenries;

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		COILS,
		coded WHT-BLU dot
L 102	24B840042	RF: choke; 1 microhenries; coded RED-BLK dot
L 103	24K840559	RF: choke; 1.2 microhenries; coded BLK-GRN dot
		CONNECTOR, plug: male;
P 101	28K849416	Single contact; round brown bakelite insulator; cable mounted
		RESISTORS,
R 1	6R6394	Fixed: carbon; 12K ±10%; 1/2 w; ins.; p/o L 2
R 2	6R5591	Fixed: carbon; 18K ±10%; 1/2 w; ins.; p/o L 6
R 3	6R6398	Fixed: carbon; 150K ±10% 1/2 w; ins.; p/o L 8
R 4	6R6031	Fixed: carbon; 100K ±10%, 1/2 w; ins.; p/o L 11
R 5		NOT USED
R 6		NOT USED
R 7		NOT USED
R 8	6R6074	Fixed: carbon; 68K ±10%; 1/2 w; ins.; 2 req'd; p/o L 14
R 9		Same as R 8 except p/o L 15
R 10	6R6410	Fixed: carbon; 33K ±10%; 1/2 w; ins.
R 11	6R6428	Fixed: carbon; 6.8K ±10%; 1/2 w; ins.; p/o T 1
R 12	6R6433	Fixed: carbon; 2.2 megohm ±10%; 1/2 w; ins.; p/o T 1
R 13	6R6397	Fixed: carbon; 22K ±10%; 1/2 w; ins.; p/o T 1
R 101		Same as R 4
R 102	6R6446	Fixed: carbon; 4.7 megohm ±10%; 1/2 w; ins.
R 103		Same as R 4
R 104	6R6377	Fixed: carbon; 470K ±10%; 1/2 w; ins.
R 105	6R6069	Fixed: carbon; 2.2K ±10%; 1/2 w; ins.
R 106	6R400490	Fixed: carbon; 8.2K ±5%; 1/2 w; ins.
R 107	6R400066	Fixed: carbon; 220K ±5%; 1/2 w; ins.
R 108	6R2075	Fixed: carbon; 12K ±5%; 1/2 w; ins.
R 109	6R6048	Fixed: carbon; 47K ±10%; 1/2 w; ins.
R 110	6R6479	Fixed: carbon; 68K ±5%; 1/2 w; ins.
R 111		Same as R 105
R 112		Same as R 104
R 113		Same as R 105
R 114		Same as R 3 except p/o Basic Chassis
R 115	6R5644	Fixed: carbon; 82K ±10%; 1/2 w; ins.
R 116	6R5646	Fixed: carbon; 390K ±10%; 1/2 w; ins.
R 117	6R6117	Fixed: carbon; 5.6K ±10%; 1/2 w; ins.
R 118	6R6326	Fixed: carbon; 100 ohm ±10%; 1/2 w; ins.
R 119	6R5553	Fixed: carbon; 100K ±5%; 1/2 w; ins.
R 120	6R6270	Fixed: carbon; 220 ohm ±10%; 1/2 w; ins.
R 121		same as R115
R 122	6R5585	Fixed: carbon; 8.2 megohm ±10%; 1/2 w; ins;

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		RESISTORS, (cont'd)
R 123		Same as R 119
R 124		Same as R 3 except p/o Basic Chassis
R 125	6R488095	Fixed: carbon; 18K ±5%; 1/2 w; ins.; 60 KC models only
R 125S	6R5553	Fixed: carbon; 100K ±5%; 1/2 w; ins.; 30 KC models only
R 126	6R6414	Fixed: carbon; 270K ±10%; 1/2 w; ins.
R 127	6R6046	Fixed: carbon; 1 megohm ±10%; 1/2 w; ins.
R 128	6R400228	Fixed: carbon; 1.5 megohm ±5%; 1/2 w; ins.
R 129	6R401006	Fixed: carbon; 56K ±5%; 1/2 w; ins.
R 130	6R5631	Fixed: carbon; 120K ±10%; 1/2 w; ins.
R 131		Same as R 128
R 132		Same as R 119
R 133		Same as R 3 except p/o Basic Chassis
R 134		Same as R 127
R 135		Same as R 127
R 136		Same as R 119
R 137	6R6477	Fixed: carbon; 15K ±10%; 1/2 w; ins.
R 138		Same as R 109
R 139	6R401006	Fixed: carbon; 56K ±5%; 1/2 w; ins.; 60 KC models only
R 139S	6R2061	Fixed: carbon; 180K ±5%; 1/2 w; ins.; 30 KC models only
R 140		Same as R 139
R 140S		Same as R 139S
R 141	6R5773	Fixed: carbon; 820K ±5%; 1/2 w; ins.
R 142	18K845110	Variable: carbon; 200K ±20%; 1/4 w
R 143		Same as R 128
R 144	6R5772	Fixed: carbon; 47K ±5%; 1/2 w; ins.
R 145		Same as R 3 except p/o Basic Chassis
R 146	6R6040	Fixed: carbon; 680 ohm ±10%; 1/2 w; ins. 60 KC models only
R 146S	6R6270	Fixed: carbon; 220 ohm ±10%; 1/2 w; ins.; 30 KC models only
R 146S		
R 147		Same as R 3 except p/o Basic Chassis
R 148	6R6407	Fixed: carbon; 220K ±10%; 1/2 w; ins.
R 149		Same as R 148
R 150		Same as R 127
R 151		Same as R 13 except p/o Basic Chassis
R 152	6R5796	Fixed: carbon; 560K ±5%; 1/2 w; ins. 60 KC models only
R 152S	6R5587	Fixed: carbon; 1 megohm ±5%; 1/2 w; ins. 30 KC models only
R 153	6R6497	Fixed: carbon; 3.3 megohm ±10%; 1/2 w; ins.
R 154	6R490110	Fixed: carbon; 3.9 megohm ±10%; 1/2 w; ins.
R 155	6R2089	Fixed: carbon; 1.8K ±10%; 1/2 w; ins.
R 156	6R6434	Fixed: carbon; 27K ±10%; 1/2 w; ins.
R 157		Same as R 156
R 158	6R2097	Fixed: carbon; 6.8 megohm ±10%; 1/2 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		RESISTORS, (cont'd)
R 159	6R400334	Fixed: carbon; 12 megohm ±10%; 1/2 w; ins.
R 160	6R6475	Fixed: carbon 680K ±10%; 1/2 w; ins.
R 161		Same as R 119
R 162		Same as R 104
R 163		Same as R 128
R 164		Same as R 10
R 165		Same as R 11
		TRANSFORMERS,
T 1	1V842353	Discriminator: base coded BLUE dot; includes two 76A821495 CORE, adjustable tuning; coded YELLOW dot
T 101	25K847479	AF: output; 5000 ohm to 3.2 ohm at 55 ma. dc
		TUBE, electron:
V 101	195T170A01	type 6AK5
V 102	195T225A01	type 6CE5/6BC5
V 103	195T212A01	type 6AB4
V 104	195T175A01	type 6BH6
V 105	195T113A02	type 12AT7
V 106	195T147A03	type 6CB6
V 107		same as V106
V 108		same as V106
V 109		same as V104
V 110	195T176A01	type 6BJ6
V 111	195T111A03	type 6AL5
V 112		same as V104
V 113	195T179A01	type 6C4
V 114		same as V105
V 115	195T101A01	type 6AQ5
		LINE, RF transmission:
W101	1V857900	assembly; includes: 30B849414 CABLE, RF: coaxial: RG-58A/U; 4" length required; includes reference part P101
		SOCKETS,
XV 101	9B834083	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 102		Same as XV 101
XV 103	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield
XV 104		Same as XV 103
XV 105	9B881243	Tube: female; 9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 106		Same as XV 101
XV 107	9B87123	Tube: female; 7 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 108		Same as XV 107
XV 109		Same as XV 107
XV 110		Same as XV 107
XV 111		Same as XV 107
XV 112		Same as XV 107
XV 113		Same as XV 107
XV 114	9B86868	Tube: female; 9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		COILS,
L 1L	24K836515	RF: Antenna; base stamped AD4; includes 76A824120 CORE, adjustable tuning
L 1H	24B824102	RF: Antenna; base stamped 102; includes 76A824120 CORE, adjustable tuning
L 2L	24K836518	RF: Plate; base stamped AD7; includes 76A824120 CORE, adjustable tuning
L 2H	24B824104	RF: Plate; base stamped 104; includes 76A824120 CORE, adjustable tuning
L 3L	24K836519	RF: Coupling; base stamped AD8; includes 76A824120 CORE, adjustable tuning
L 3H	24B824106	RF: Coupling; base stamped 106; includes 76A824120 CORE, adjustable tuning
L 4L	24K836520	RF: Mixer Grid; base stamped AD9; includes 76A824120 CORE, adjustable tuning
L 4H	24K824107	RF: Mixer Grid; base stamped 107; includes 76A824120 CORE, adjustable tuning
L 5	24B840709	RF: 1st Oscillator; base stamped AR7; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 6L	24K824105	RF: 1st Multiplier; base stamped 105; includes 76A824120 CORE, adjustable tuning and reference parts C8, R2
L 6H		Same as L 6L
L 7L	24K836516	RF: Injection; base stamped AD5; includes 76A824120 CORE, adjustable tuning
L 7H	24K824103	RF: Injection; base stamped 103; includes 76A824120 CORE, adjustable tuning
L 8	24K834778	IF: 12 mc IF - 1; base stamped AA2; includes 76A824118 CORE, adjustable tuning
L 9	24B824109	IF: 12 mc IF-2 base stamped 109; includes 76A824118 CORE, adjustable tuning
L 10	24B824110	IF: 12 mc IF - 3; base stamped 110; includes 76A824118 CORE, adjustable tuning
L 11	24K834779	IF: 12 mc IF - 4; base stamped AA3; includes 76A824118 CORE, adjustable tuning
L 12	24K824111	IF: 12 mc IF - 5; base stamped 111; includes 76A824118 CORE, adjustable tuning
L 13	24K824112	IF: 12 mc IF - 6; base stamped 112; includes 76A824118 CORE, adjustable tuning
L 14	24K854048	IF: 2nd IF - 1; base stamped BC6; includes 46K891110 CORE, adjustable tuning; coded GRN dot and reference parts C23, R8
L 15		Same as L 14 except 2nd IF - 2 inc. reference parts C24 R9
L 16		Same as L 14 except 2nd IF - 3
L 101	24A840728	RF: choke; 4 microhenries; coded WHT-BLU dot
L 102	24B840042	RF: choke; 1 microhenries; coded RED-BLK dot
L 103	24K840559	RF: choke; 1.2 microhenries; coded BLK-GRN dot
		CONNECTOR, plug: male;
P 101	28K849416	Single contact; round brown bakelite insulator; cable mounted
		RESISTORS,
R 1	6R6394	Fixed: carbon; 12K ±10%; 1/2 w; ins.; p/o L 2
R 2	6R5591	Fixed: carbon; 18K ±10%; 1/2 w; ins.; p/o L 6
R 3	6R6398	Fixed: carbon; 150K ±10% 1/2 w; ins.; p/o L 8
R 4	6R6031	Fixed: carbon; 100K ±10%, 1/2 w; ins.; p/o L 11
R 5		NOT USED
R 6		NOT USED
R 7		NOT USED
R 8	6R6074	Fixed: carbon; 68K ±10%, 1/2 w; ins.; 2 req'd; p/o L 14
R 9		Same as R 8 except p/o L 15
R 10	6R6410	Fixed: carbon; 33K ±10%; 1/2 w; ins.
R 11	6R6428	Fixed: carbon; 6.8K ±10%; 1/2 w; ins.; p/o T 1
R 12	6R6433	Fixed: carbon; 2.2 megohm ±10%; 1/2 w; ins.; p/o T 1
R 13	6R6397	Fixed: carbon; 22K ±10%; 1/2 w; ins.; p/o T 1
R 101		Same as R 4
R 102	6R6446	Fixed: carbon; 4.7 megohm ±10%; 1/2 w; ins.
R 103		Same as R 4
R 104	6R6377	Fixed: carbon; 470K ±10%; 1/2 w; ins.
R 105	6R6069	Fixed: carbon; 2.2K ±10%; 1/2 w; ins.
R 106	6R400490	Fixed: carbon; 8.2K ±5%; 1/2 w; ins.
R 107	6R400066	Fixed: carbon; 220K ±5%; 1/2 w; ins.
R 108	6R2075	Fixed: carbon; 12K ±5%; 1/2 w; ins.
R 109	6R6048	Fixed: carbon; 47K ±10%; 1/2 w; ins.
R 110	6R6479	Fixed: carbon; 68K ±5%; 1/2 w; ins.
R 111		Same as R 105
R 112		Same as R 104
R 113		Same as R 105
R 114		Same as R 3 except p/o Basic Chassis
R 115	6R5644	Fixed: carbon; 82K ±10%; 1/2 w; ins.
R 116	6R5646	Fixed: carbon; 390K ±10%; 1/2 w; ins.
R 117	6R6117	Fixed: carbon; 5.6K ±10%; 1/2 w; ins.
R 118	6R6326	Fixed: carbon; 100 ohm ±10%; 1/2 w; ins.
R 119	6R5553	Fixed: carbon; 100K ±5%; 1/2 w; ins.
R 120	6R6270	Fixed: carbon; 220 ohm ±10%; 1/2 w; ins.
R 121		same as R115
R 122	6R5585	Fixed: carbon; 8.2 megohm ±10%; 1/2 w; ins;
		RESISTORS, (cont'd)
R 123		Same as R 119
R 124		Same as R 3 except p/o Basic Chassis
R 125	6R488095	Fixed: carbon; 18K ±5%; 1/2 w; ins.; 60 KC models only
R 125S	6R5553	Fixed: carbon; 100K ±5%; 1/2 w; ins.; 30 KC models only
R 126	6R6414	Fixed: carbon; 270K ±10%; 1/2 w; ins.
R 127	6R6046	Fixed: carbon; 1 megohm ±10%; 1/2 w; ins.
R 128	6R400228	Fixed: carbon; 1.5 megohm ±5%; 1/2 w; ins.
R 129	6R401006	Fixed: carbon; 56K ±5%; 1/2 w; ins.
R 130	6R5631	Fixed: carbon; 120K ±10%; 1/2 w; ins.
R 131		Same as R 128
R 132		Same as R 119
R 133		Same as R 3 except p/o Basic Chassis
R 134		Same as R 127
R 135		Same as R 127
R 136		Same as R 119
R 137	6R6477	Fixed: carbon; 15K ±10%; 1/2 w; ins.
R 138		Same as R 109
R 139	6R401006	Fixed: carbon; 56K ±5%; 1/2 w; ins.; 60 KC models only
R 139S	6R2061	Fixed: carbon; 180K ±5%; 1/2 w; ins.; 30 KC models only
R 140		Same as R 139
R 140S		Same as R 139S
R 141	6R5773	Fixed: carbon; 820K ±5%; 1/2 w; ins.
R 142	18K845110	Variable: carbon; 200K ±20%; 1/4 w
R 143		Same as R 128
R 144	6R5772	Fixed: carbon; 47K ±5%; 1/2 w; ins.
R 145		Same as R 3 except p/o Basic Chassis
R 146	6R6040	Fixed: carbon; 680 ohm ±10%; 1/2 w; ins. 60 KC models only
R 146S	6R6270	Fixed: carbon; 220 ohm ±10%; 1/2 w; ins.; 30 KC models only
R 146S		
R 147		Same as R 3 except p/o Basic Chassis
R 148	6R6407	Fixed: carbon; 220K ±10%; 1/2 w; ins.
R 149		Same as R 148
R 150		Same as R 127
R 151		Same as R 13 except p/o Basic Chassis
R 152	6R5796	Fixed: carbon; 560K ±5%; 1/2 w; ins. 60 KC models only
R 152S	6R5587	Fixed: carbon; 1 megohm ±5%; 1/2 w; ins. 30 KC models only
R 153	6R6497	Fixed: carbon; 3.3 megohm ±10%; 1/2 w; ins.
R 154	6R490110	Fixed: carbon; 3.9 megohm ±10%; 1/2 w; ins.
R 155	6R2089	Fixed: carbon; 1.8K ±10%; 1/2 w; ins.
R 156	6R6434	Fixed: carbon; 27K ±10%; 1/2 w; ins.
R 157		Same as R 156
R 158	6R2097	Fixed: carbon; 6.8 megohm ±10%; 1/2 w; ins.
		RESISTORS, (cont'd)
R 159	6R400334	Fixed: carbon; 12 megohm ±10%; 1/2 w; ins.
R 160	6R6475	Fixed: carbon 680K ±10%, 1/2 w; ins.
R 161		Same as R 119
R 162		Same as R 104
R 163		Same as R 128
R 164		Same as R 10
R 165		Same as R 11
		TRANSFORMERS,
T 1	1V842353	Discriminator: base coded BLUE dot; includes two 76A821495 CORE, adjustable tuning; coded YELLOW dot
T 101	25K847479	AF: output; 5000 ohm to 3.2 ohm at 55 ma. dc
		TUBE, electron:
V 101	195T170A01	type 6AK5
V 102	195T225A01	type 6CE5/6BC5
V 103	195T212A01	type 6AB4
V 104	195T175A01	type 6BH6
V 105	195T113A02	type 12AT7
V 106	195T147A03	type 6CB6
V 107		same as V106
V 108		same as V106
V 109		same as V104
V 110	195T176A01	type 6BJ6
V 111	195T111A03	type 6AL5
V 112		same as V104
V 113	195T179A01	type 6C4
V 114		same as V105
V 115	195T101A01	type 6AQ5
		LINE, RF transmission:
W101	1V857900	assembly; includes: 30B849414 CABLE, RF: coaxial: RG-58A/U; 4" length required; includes reference part P101
		SOCKETS,
XV 101	9B834083	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 102		Same as XV 101
XV 103	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield
XV 104		Same as XV 103
XV 105	9B881243	Tube: female; 9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 106		Same as XV 101
XV 107	9B87123	Tube: female; 7 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 108		Same as XV 107
XV 109		Same as XV 107
XV 110		Same as XV 107
XV 111		Same as XV 107
XV 112		Same as XV 107
XV 113		Same as XV 107
XV 114	9B86868	Tube: female; 9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
		SOCKETS, (cont'd)
XV 115		Same as XV 107
		SOCKETS,
XY 102	9K857508	Crystal: female; 4 contact; square; molded black bakelite base; chassis mounted
XY 102	9K861367	Crystal: female; 2 contact; rectangular; black phenolic base; chassis mounted

Components unique for Two-Frequency Receiver Chassis are as follows:

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS,
C 8H	21R791561	Fixed: ceramic; tubular; 6 uuf ±.5 uuf; 500 vdcw; p/o L 6H (24B838987) Note: Replaces C 8H (21R490602) p/o L 6H (24K824105) used only in 1-Frequency operation
C 201	21K840716	Fixed: ceramic; disc; 24 uuf ±5%; 500 vdcw; p/o L 201
C 202	21K840711	Fixed: molded silver mica; 51 uuf ±5%; 500 vdcw; p/o L 201
C 203	21B837745	Fixed: ceramic; disc; 820 uuf ±10%; 500 vdcw
C 204	20B840719	Variable: air; 8 uuf min. to 50 uuf max.
C 205	21K838284	Fixed: ceramic; disc; 3.9 uuf ±.25 uuf; 250 vdcw
C 206		NOT USED
C 207		Same as C 203
C 208	21K837746	Fixed: ceramic; disc; 2000 uuf ±10%; 500 vdcw
C 209		Same as C 203
C 210	21B800801	Fixed: ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw
		COILS,
L 6H	24B838987	RF: 1st Multiplier; base stamped AP7; includes: 76A838181 CORE, adjustable tuning Note: Replaces L 6H (24K824105) used only in 1-Frequency operation
L 201	24B840709	RF: 2nd Oscillator; base stamped AR7; includes: 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 202	24A840728	RF: choke; 4 uh; coded WHT-BLU dot
L 203	24B840042	RF: choke; 1 uh; coded RED-BLK dot
L 204	24K840559	RF: choke; 1.2 uh; coded BLK-GRN dot
		RESISTORS,
R 201	6R400066	Fixed: carbon; 220K ±5%; 1/2 w; ins.
R 202	6R2075	Fixed: carbon; 12K ±5%; 1/2 w; ins.
R 203		NOT USED
R 204		NOT USED
R 205	6R400490	Fixed: carbon; 8.2K ±5%; 1/2 w; ins.
		TUBE, electron:
V 201	195T225A01	type 6CE5/6BC5
		SOCKETS,
XV 201	9B834083	Tube: female; 7 contact; miniature molded mica filled phenolic base; saddle mounting includes center shield and tube shield base
XY 201	9K857508	Crystal: female; 4 contact; square; molded black bakelite base; chassis mounted

FILTER

		TU540S "PERMAKAY" IF Filter; 30 KC Channel Spacing TU540W "PERMAKAY" IF Filter; 60 KC Channel Spacing

CRYSTAL

NOTE

Crystals are part of the Radio Set model. When ordering a receiver chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

		CRYSTAL UNITS,
Y 101	Type DM10/ RM10	Quartz: Receiver Control Oscillator; 26.4-32.4 MC; with 6 volt heater unit
Y 102	Type GO3	Quartz: Receiver IF Oscillator; 12.455 MC
Y 201		Same as Y 101

GUARANTEED PERFORMANCE SPECIFICATIONS

BASIC UNIT	TTD1000 Series
CRYSTAL MULTIPLICATION	Twenty-four (24) times
POWER SUPPLY	Separate power supply required
SPURIOUS AND HARMONIC EMISSION	All spurious and harmonic emissions are attenuated at least 60 db below carrier level.
FREQUENCY STABILITY AND TEMPERATURE RANGE	Oven type crystal unit maintains carrier within ±.0005 percent of assigned center frequency from -30°C to +60°C ambient (+25°C reference).
MODULATION	40F3: ±15 kc for 100 percent at 1000 cps 20F3: ±5 kc for 100 percent at 1000 cps
AUDIO INPUT LEVEL	Factory connection: 0.25 volt ±3 db for 100 percent modulation at 1000 cps (approximately -17 db). Optional connection: 0.18 volt ±3 db for 100 percent modulation at 1000 cps (approximately -20 db).
TUBE COMPLEMENT AND FUNCTION	(1) 6CB6 - R-F Oscillator (1-Freq) or (2) 6CB6 - R-F Oscillators (2-Freq) (1) 12AT7 - Modulator, Buffer-Doubler (1) 6CB6 - Tripler (1) 6AK6 - 2nd Doubler (1) 2E26 - Doubler Driver (1) 6146 - Final Amplifier (1) 6BH6 - IDC Amplifier (1) 6AL5 - IDC Clipper
NUMBER OF TUNED CIRCUITS	9 following the modulator including 4 tuned multiplier stages, and output circuit
VOLTAGE REQUIREMENTS	For 25 Watts Output: 395 v d-c at 150 ma 270 v d-c at 105 ma 150 v d-c at 10 ma -20 v d-c bias For 10 Watts Output: 345 v d-c at 120 ma 270 v d-c at 50 ma 150 v d-c at 8 ma -17 v d-c bias
DIMENSIONS	15" long x 2-3/8" wide x 5-1/4" high, overall
WEIGHT	4-1/4 lbs

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

A two-frequency transmitter can be operated on frequencies which are separated by as much as 300 kc from circuit resonance without degradation of the single-frequency performance specifications. All tuned circuits following the oscillators, are normally aligned to the higher, or preferably to the more often used of the two carrier frequencies.

2. CONTROL CRYSTAL REQUIREMENTS

Control crystals, as listed in the MODEL CHART, are required for use with these transmitters and should be ordered separately. See the FOREWORD of the manual for ordering information.

3. CIRCUIT OPERATION

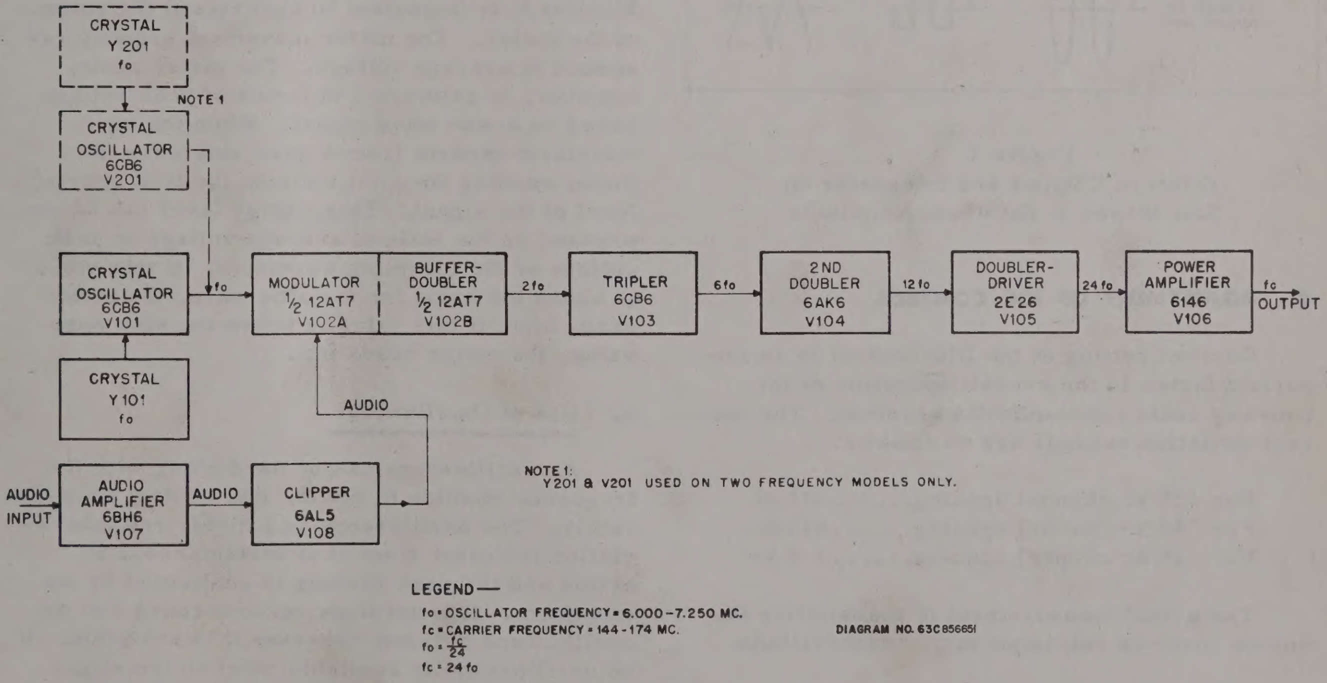
Stage-by-stage signal flow and operating frequencies are shown on the Block Diagram. Refer to this diagram and Schematic Diagram, Number 63E856736 to trace the following circuit operation.

a. Audio Input and Amplifier Stage

A **Motorola dynamic microphone with** built-in transistorized pre-amplifier is usually used with this transmitter. The microphone connects between ground and the shielded lead of the audio amplifier input circuit. A well-filtered d-c voltage source of approximately 15 volts connects to R117. This voltage is dropped through resistors R117 and R118 to a value of approximately 4 vdc providing operating power for the transistorized (or carbon) microphone. The microphone cartridge and pre-amplifier act like a variable voltage generator. The output voltage varies with the intensity and frequency of the sound waves which strike the diaphram. Reasonably loud sounds produce an output of 0.25 vac, which provides full deviation of the r-f carrier. If increased sensitivity is desired, a tap can be changed (see schematic diagram, note 6) to provide full deviation of the transmitter with a 0.18 vac audio signal.

b. Audio-IDC Circuit

Microphone audio output is applied to the clipper tube where the peaks are clipped then the audio is connected to the IDC (instantaneous deviation control) circuit. This circuit limits the slope (steepness) of the audio signals which pass through it, as illustrated in Figure 1. The IDC control sets the amplitude of the signals thereby limiting the maximum wavefront slope



BLOCK DIAGRAM

of the signals applied to the modulator (see Figure 2). This controls transmitter deviation, since the modulator frequency shift is proportional to the slope of the audio input waveform.

The audio signal then flows through a modulation filter circuit to the modulator.

c. Modulator Stage to Power Output Stage

The modulator output frequency is doubled, tripled, then doubled two more times in succeeding stages and connected to the input of the power amplifier stage. The power amplifier output connects through a harmonic filter to the antenna relay.

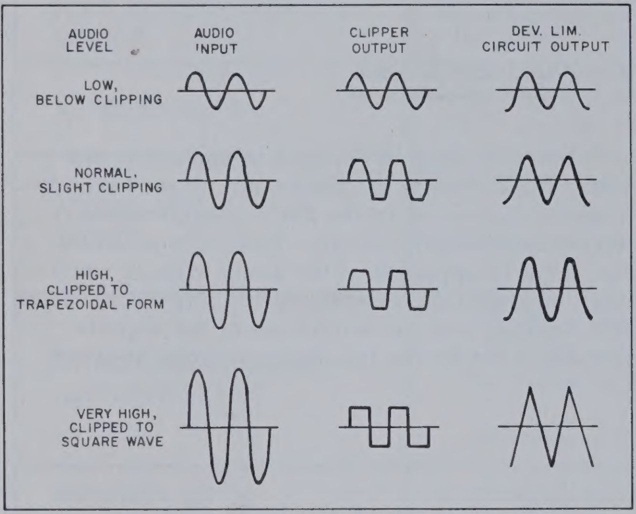


Figure 1
Effect of Clipper and Integrator on
Sine Waves of Different Amplitude

4. ADJUSTMENT OF IDC CONTROL

Correct setting of the IDC control is an important factor in the overall operation of the two-way radio communication system. The correct deviation settings are as follows:

For 120 kc channel spacing......±15 kc
For 60 kc channel spacing......±15 kc
For 30 kc channel spacing......± 5 kc

The actual measurement of transmitter deviation involves two important considerations:

First: the accuracy of the test equipment being used.

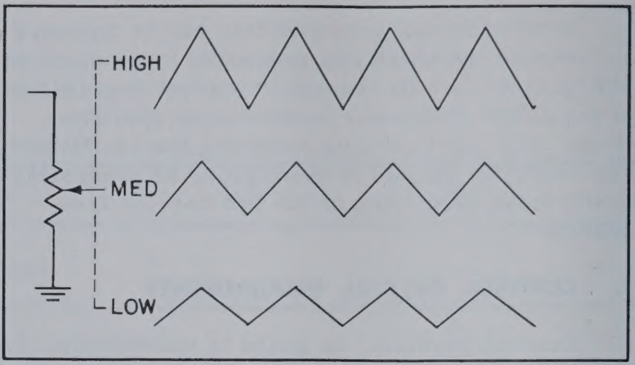


Figure 2
How IDC Control Sets Steepness
of Integrated Square Wave

Second: understanding the characteristics of the test equipment.

a. Test Equipment

In this text we shall use the Motorola T1130A Series Frequency Monitor as the basic test instrument. This unit offers the degree of accuracy required for measurement of transmitter deviation.

b. Instrument Characteristics

In using the T1130A Series Frequency Monitor it is important to understand the action of the meter. The meter movement actually responds to average voltage. The meter scale, however, is calibrated in terms of peak voltage based on a sine wave signal. When the input waveform departs from a pure sine wave the meter reading does not indicate the true energy level of the signal. This energy level can be expressed as the ratio of average voltage to peak voltage of the incoming waveform. If this value is above the value for the sine wave, the meter reads high; if this value is below the sine wave value, the meter reads low.

c. Use of Oscilloscope

An oscilloscope can be used along with the frequency monitor to set the IDC control accurately. The oscilloscope is a highly reliable deviation indicator since it is instantaneous in action and the peak reading is unaffected by the waveform. It is strongly recommended that an oscilloscope be used wherever it is available. If no oscilloscope is available refer to the alignment procedures for setting of the IDC control by means of the frequency monitor alone.

Set up the equipment as described in the MEASUREMENT section of the frequency monitor manual. Connect the 'scope across the discriminator output. Modulate the transmitter with a 1000 cps tone connected across the microphone input terminals at the transmitter. Connect an a-c vtvm across these terminals also.

Calibrate the 'scope as follows: adjust the tone modulation level for a reading of 10 kc deviation on the monitor deviation meter. With a sine wave pattern on the screen use the vertical gain control to set the overall height to the convenient size, e.g., 10 full squares on the screen. This calibrates the 'scope for a reading of 1 square for each kc deviation.

Turn the IDC control to the full clockwise position. Increase the tone level to a minimum of one volt at the audio input terminals. Now turn the IDC control slowly counter-clockwise until the height of the pattern represents the required transmitter deviation (±15 kc for 60 and 120 kc channel spacing, ±5 kc for 30 kc channel spacing operation).

5. ALIGNMENT PROCEDURES

The transmitter is tuned and adjusted for its exact operating frequency prior to shipment from the factory. It should require no further adjustment before placing it in service, other than to align the final r-f amplifier stage to the antenna. If it becomes necessary for the transmitter to be retuned, use a Motorola test set and follow the steps in the alignment procedure in this section of the manual.

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. For stages V102 through V105, the meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured. For stages V106, connect this meter and resistance across B++ and meter plug J3 pin #8 (in parallel with R131); the meter reading multiplied by 5 will indicate the total plate current flow in milliamperes. The required metering pin receptacle information is shown on the schematic diagram.

AEPD-1697-A (CE1317-B)

FINAL METER READINGS

ter is aligned or tested, final meter readings should be made and entered in

the table below are minimum except PA, which is maximum. DO NOT ex-
he PA current. This is the maximum plate current to which the unit can be

are purely relative and do not give actual current or voltage measurement.

00 or the P-8501 series test sets, position 7 is a d-c voltmeter with 1000 volts
ding is obtained by multiplying the microampere scale reading by 20. The
ve a 0-1000 volt d-c scale from which the B+ is read directly.

00 or the P-8501 series test sets, position 8 indicates d-c relay control volt-
is not keyed. Multiply the microampere scale reading by 0.3 to obtain the
ltage. When using the TU546 series test sets, the relay control voltage is
ition selector switch in position 10.

portable test sets, multiply the scale reading by 5 to obtain the actual PA
eres.

ERIES	1	2	3	-4	5	6	7	8	PA(+4)
ERIES	1	2	3	4	5	6	9	10	7
TS	-	-	4	6	11	9	18 ua 400V	-	30 max.
TS	-	-	4	6	11	9	17 ua 335V	-	25 max.

Transmitter Alignment Procedure
Motorola No. EPD-1698-C
1/15/60-CP

PRE-ALIGNMENT NOTES

EXCERPTS FROM FCC REGULATIONS

1. Radio transmitters may be tuned or adjusted only by duly authorized radio operators or by personnel working directly under their supervision.

2. The r-f power output of a station shall be no more than required for satisfactory technical operation considering the area to be covered and the local conditions.

TEST EQUIPMENT REQUIRED

1. MOTOROLA Portable Test Set (TU546 series, P-8500 series or P-8501 series)
2. MOTOROLA K-9322 Alignment Tool Kit
3. MOTOROLA T1130A Series Frequency Monitor or equivalent (for oscillator alignment and deviation adjustment)
4. R-F wattmeter or dummy antenna
5. Power Supply (preferably the one designed for the transmitter under test)

HOW TO SET UP THE P-8500 SERIES AND THE P-8501 SERIES TEST SETS

1. Connect the dummy antenna or r-f wattmeter to the transmitter ANT. jack.
2. Connect the test set cable plug to the transmitter METER jack.
3. Place the test set REC. - XMTR. -0-50 UA switch in the XMTR. position.
4. Place the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.
5. Connect the power supply to the transmitter as shown on the intercabling diagram for the equipment.
6. If the power supply chassis has a HI-LO switch place it in the LO position.
7. Turn the equipment on. Allow 30 seconds for the tubes to warm up.

HOW TO SET UP THE TU546 SERIES TEST SET

1. Connect the dummy antenna or r-f wattmeter to the transmitter ANT. jack.
2. Connect one end of the metering cable to the test set and the other end to the transmitter METER receptacle.
3. Place the Function Selector Switch in the XMTR. position.
4. Place the oscillator and meter reversing switch in the OFF position.
5. Connect the power supply to the transmitter as shown on the intercabling diagram for the radio set.
6. Place the HI-LO switch on the power supply in the LO position.
7. Turn the equipment on. Allow 30 seconds for the tubes to warm up.

NOTE

Any 0-50 microampere meter with an equivalent series resistance of 20,000 ohms may be used as a metering device. The meter should be connected from chassis ground to the pin receptacle of the metering socket corresponding to the stage being measured for stages V102 through V105. For stage V106, connect this meter and resistance across B++ and meter plug J103 pin #8 (in parallel with R131); the meter reading multiplied by 5 will indicate the total plate current flow in milliamperes. The required metering pin receptacle information is shown on the schematic diagram.

TEST SET SWITCH POSITIONS

P-8500 & P-8501 Series	1	2	3	-4	+4(PA)	5	6	7	8
TU546 Series	1	2	3	4	7	5	6	9	10
Circuit Metered	—	—	Tripler Grid	2nd Doubler Grid	PA Plate Current	Doubler Driver Grid	PA Grid	PA Plate Voltage	Push-to-Talk

HOW TO KEY THE TRANSMITTER

1. Use the XMTR-ON switch of the test set to place the unmodulated carrier on the air for meter reading and adjustment.

2. Use a MOTOROLA TU353A Microphone (or equivalent) to key the transmitter and modulate the carrier as required.

CAUTION

Do not key the transmitter for more than a few seconds at a time until it is properly tuned. Plate current is excessive in untuned stages and may damage the unit. Turn the transmitter on for brief periods while reading the meter and making the adjustments.

FREQUENCY CALCULATIONS

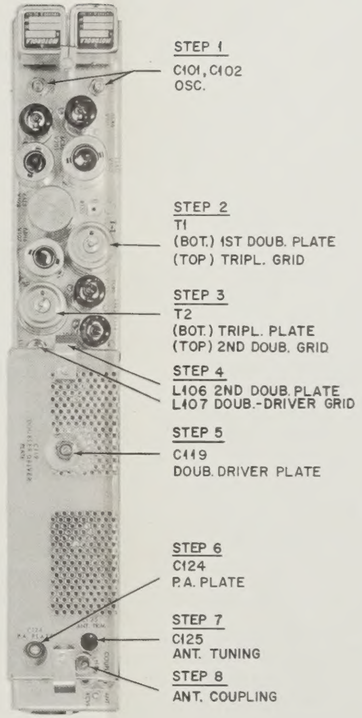
$f_o = \frac{f_c}{24}$ where: f_o = crystal frequency, and f_c = carrier frequency

HOW TO SET IDC CONTROL

1. Equipment Required
   - a. Motorola Model T1130A Series Frequency Monitor (or equivalent)
   - b. A-C vtvm
   - c. 1000 cps tone generator
   - d. Oscilloscope (not required, but strongly recommended as a highly reliable deviation indicator --use of available.

2. Oscilloscope Method (preferred)
   - a. Set Up. Connect the oscilloscope across the monitor receiver oscilloscope terminals on the front of the frequency monitor. Connect the tone generator and vtvm across the transmitter audio input. Make a wire loop antenna, place it around the plate tuning capacitor shaft (C124, PA PLATE) on the top of the PA Deck, and connect it to the monitor r-f input jack. Turn on the transmitter and modulate it with a 1000 cps tone.
   - b. Calibration. Calibrate the oscilloscope as follows: Set the IDC control to maximum clockwise position; adjust the tone modulation level for a reading of 10 kc deviation on the monitor deviation meter. Adjust oscilloscope for steady pattern (approx. sine wave). Set vertical gain to convenient height for measurement, e.g., 10 squares on screen. This calibrates oscilloscope for one kc per square.
   - c. Adjustment. Set the 1000 cps tone output for at least one volt on the vtvm. Adjust the IDC control until the height of the pattern represents the required transmitter deviation (±15 kc for 60 and 120 kc channel spacing; ±5 kc for 30 kc channel spacing).

3. Monitor Method
   - a. Set Up. Set up equipment for deviation measurement as described in monitor manual. Connect tone generator and vtvm across transmitter audio input. Turn on transmitter and modulate with 1000 cps tone set for at least one volt on vtvm.
   - b. Adjustment. Adjust the IDC control for a reading of ±17 kc for 60 or 120 kc channel spacing (this produces a deviation of ±15 kc at the transmitter r-f output) or ±5-1/2 kc for 30 kc channel spacing (this produces a deviation of ±5 kc at the transmitter r-f output).



STEP	SWITCH POSITION TU546 TEST SET	ADJUSTMENT	METER READING	
1	2	C101 C201	Maximum On-frequency Allow 15 minutes crystal warm-up period	OSCILLATOR. A available (Motorol Set up frequency When aligning a tw frequency monitor should be made wi to the frequency m
2	3	T1	Maximum	1ST DOUBLER. A top. The circuit f
3	4	T2	Maximum	TRIPLER. Adjust The circuit freque meter switch in po
4	5	L106 L107	Maximum	2ND DOUBLER. A frequency is twelv position 5.
5	6	C119	Maximum	DOUBLER-DRIVE meter will always indicates proper al crystal frequency.
6	7	C124	Minimum (Dip)	POWER AMPLIFIE adjustment fully cl HI-LO switch to HI
7	7	C125	Maximum	ANTENNA INPUT. (125 ma) for 10 wa
8	7	COUPLING and C124 or C125	Maximum r-f Output NOTE DO NOT EXCEED 125 ma for 10 watt models or 150 ma for 25 watt models	ANTENNA COUPL 1. Using fiel Make adju Place r-f p indication 2. Without fi Turn COU C124 for c overcoupl Recheck s locknuts o

H POSITIONS

4(PA)	5	6	7	8
7	5	6	9	10
PA Plate urrent	Doubler Driver Grid	PA Grid	PA Plate Voltage	Push- to- Talk

TRANSMITTER

the unmodulated carrier on the air for meter

uivalent) to key the transmitter and modulate the

ON
han a few seconds at a time until
excessive in untuned stages and
nitter on for brief periods while
stments.

LCULATIONS
y, and f_c = carrier frequency

DC CONTROL

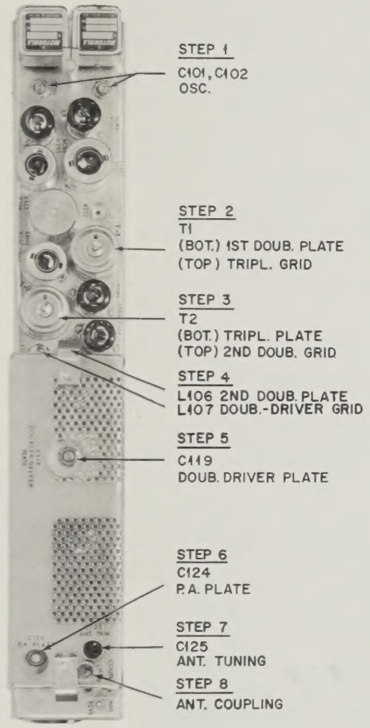
Monitor (or equivalent)

commended as a highly reliable deviation indicator

e monitor receiver oscilloscope terminals on the
tone generator and vtvm across the transmitter
ce it around the plate tuning capacitor shaft (C124,
connect it to the monitor r-f input jack. Turn on
cps tone.
ollows: Set the IDC control to maximum clock-
el for a reading of 10 kc deviation on the monitor
eady pattern (approx. sine wave). Set vertical
e.g., 10 squares on screen. This calibrates

r at least one volt on the vtvm. Adjust the IDC
ents the required transmitter deviation (±15 kc
30 kc channel spacing).

surement as described in monitor manual. Con-
itter audio input. Turn on transmitter and modu-
olt on vtvm.
eading of ±17 kc for 60 or 120 kc channel spacing
ansmitter r-f output) or ±5-1/2 kc for 30 kc
f ±5 kc at the transmitter r-f output).



STEP	SWITCH POSITION TU546 TEST SET	ADJUSTMENT	METER READING	STAGE, CONDITIONS AND PROCEDURE
1	2	C101 C201	Maximum On-frequency Allow 15 minutes crystal warm-up period	OSCILLATOR. Adjust only when primary or secondary frequency standard is available (Motorola Model T1130A Frequency Monitor or equivalent may be used). Set up frequency monitor. Adjust C101 for "on-frequency" reading on monitor. When aligning a two-frequency transmitter adjust C201, same as above, except set frequency monitor to accept frequency No. 2. The adjustments in Steps 2 through 8 should be made with the transmitter switched to the higher frequency or preferably to the frequency more commonly used.
2	3	T1	Maximum	1ST DOUBLER. Adjust primary slug from bottom. Adjust secondary slug from top. The circuit frequency is twice the crystal frequency.
3	4	T2	Maximum	TRIPLER. Adjust primary slug from bottom. Adjust secondary slug from top. The circuit frequency is six times the crystal frequency. Repeak T1 with the meter switch in position 4.
4	5	L106 L107	Maximum	2ND DOUBLER. Adjust L106 and L107 for maximum meter reading. The circuit frequency is twelve times the crystal frequency. Repeak T2 with the switch in position 5.
5	6	C119	Maximum	DOUBLER-DRIVER. Adjust C119 for maximum. Tune for a definite peak. The meter will always show the fixed bias in this position. A definite peak reading indicates proper alignment. The circuit frequency is twenty-four times the crystal frequency.
6	7	C124	Minimum (Dip)	POWER AMPLIFIER. Set C125 for minimum plate current. Turn COUPL INCR adjustment fully clockwise (decoupled). Tune C124 for a dip. Set power supply HI-LO switch to HI.
7	7	C125	Maximum	ANTENNA INPUT. Adjust C125 for maximum meter reading. Do not exceed 25 (125 ma) for 10 watt or 30 (150 ma) for 25 watts.
8	7	COUPLING and C124 or C125	Maximum r-f Output NOTE DO NOT EXCEED 125 ma for 10 watt models or 150 ma for 25 watt models	ANTENNA COUPLING. Remove test load and connect antenna. 1. Using field strength meter: Make adjustments with transmitter shielded as much as possible by housing. Place r-f probe near antenna. Adjust C125 and COUPL INCR for maximum r-f indication on meter. 2. Without field strength meter: Turn COUPL INCR counterclockwise (increasing) gradually while retuning C124 for dip. Increase coupling until only a slight dip is apparent. DO NOT overcouple. This causes the dip to disappear and reduces power output. Recheck setting of C125. Repeak T1, T2, L106, L107 and C119. Tighten locknuts on C124.

FINAL METER READINGS

Each time a transmitter is aligned or tested, final meter readings should be made and entered in a logbook.

All readings given in the table below are minimum except PA, which is maximum. DO NOT exceed the value given for the PA current. This is the maximum plate current to which the unit can be safely tuned.

Readings 1 through 6 are purely relative and do not give actual current or voltage measurement.

When using the P-8500 or the P-8501 series test sets, position 7 is a d-c voltmeter with 1000 volts full scale. Actual B+ reading is obtained by multiplying the microampere scale reading by 20. The TU546 series test sets have a 0-1000 volt d-c scale from which the B+ is read directly.

When using the P-8500 or the P-8501 series test sets, position 8 indicates d-c relay control voltage when the transmitter is not keyed. Multiply the microampere scale reading by 0.3 to obtain the actual value of the d-c voltage. When using the TU546 series test sets, the relay control voltage is read directly with the position selector switch in position 10.

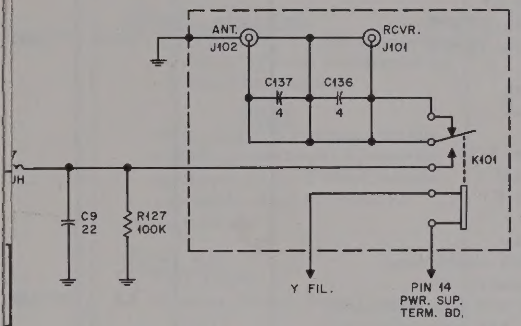
For all three series portable test sets, multiply the scale reading by 5 to obtain the actual PA plate current in milliamperes.

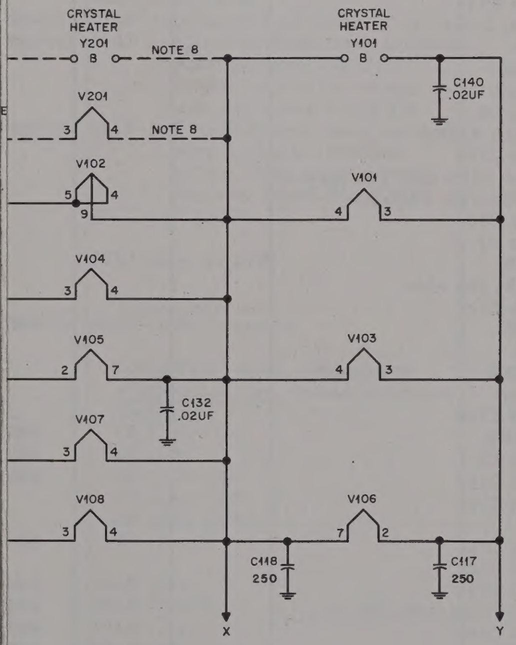
SWITCH POSITION	P-8500 & P-8501 SERIES	1	2	3	-4	5	6	7	8	PA(+4)
	TU546 SERIES	1	2	3	4	5	6	9	10	7
METER READING	25 WATTS	-	-	4	6	11	9	18 ua 400V	-	30 max.
	10 WATTS	-	-	4	6	11	9	17 ua 335V	-	25 max.

Transmitter Alignment Procedure
Motorola No. EPD-1698-C
1/15/60-CP

REVISIONS

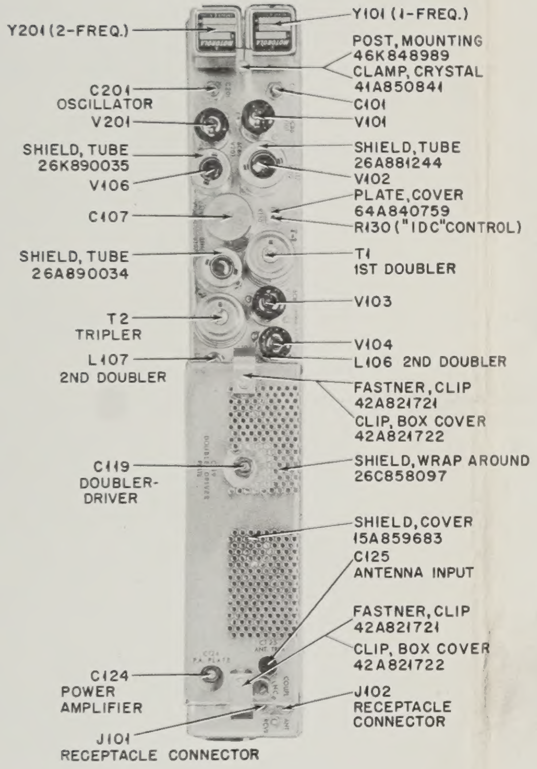
DIAG. ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
A	TTD1000AA TTD1000AB	C105	WAS 3.3 UUF	GRID OF V102A
B	TTD1000AA-1 TTD1000AB-1	R103	WAS 22K	GRID OF V101

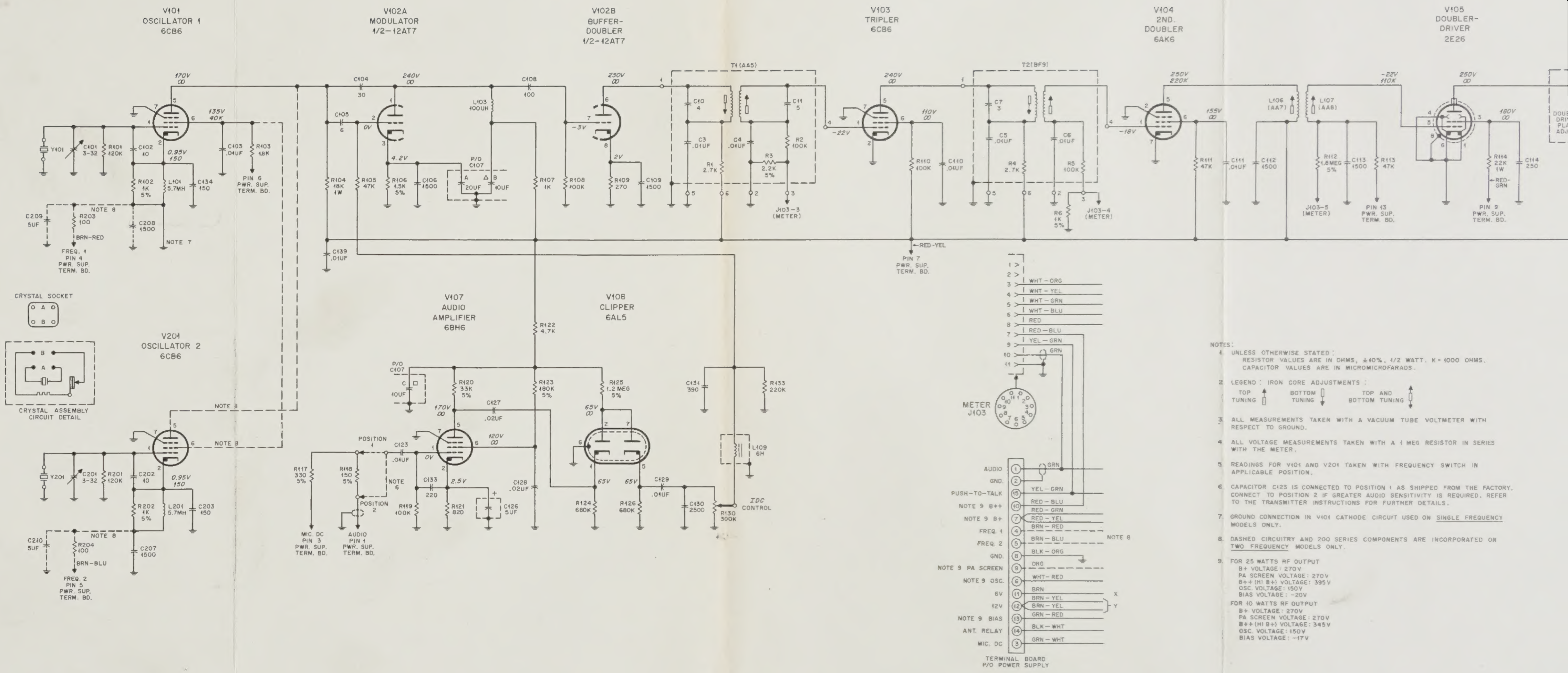




Transmitter
Schematic Diagram
Motorola No. 63E856736-C
1/15/60-CP

AEPD-1690-A (CE1135A)(CE1317C)



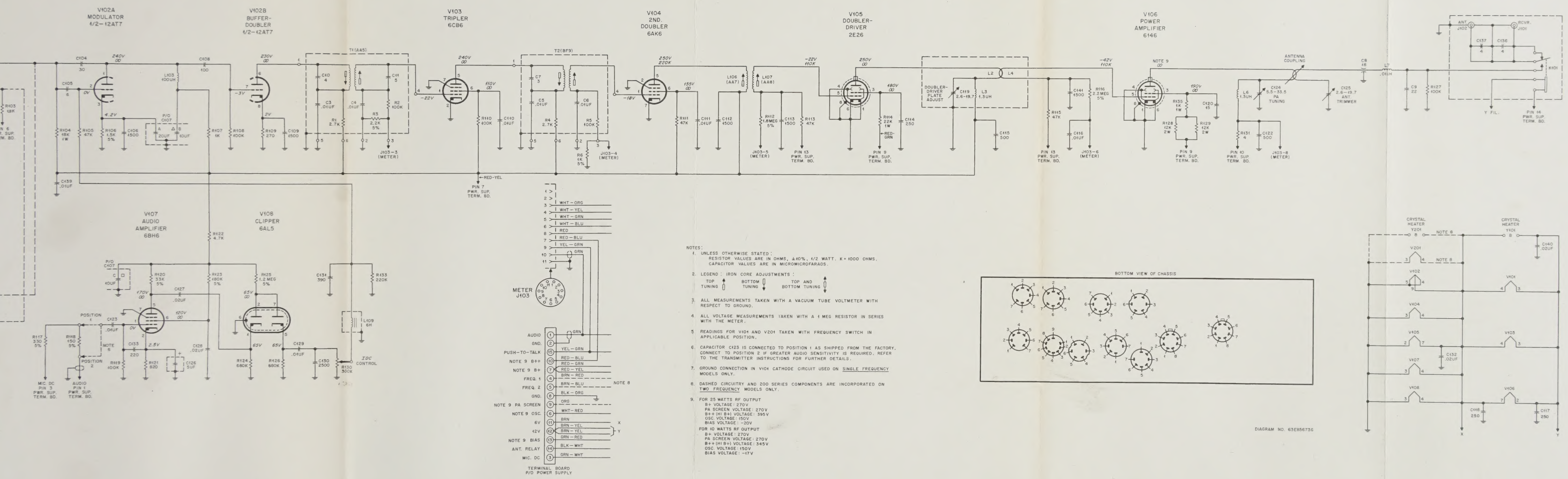


NOTES:

1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ±10%, 1/2 WATT. K = 1000 OHMS.
   CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. LEGEND: IRON CORE ADJUSTMENTS:
   TOP TUNING ↑ BOTTOM TUNING ↓ TOP AND BOTTOM TUNING ↕
3. ALL MEASUREMENTS TAKEN WITH A VACUUM TUBE VOLTMETER WITH RESPECT TO GROUND.
4. ALL VOLTAGE MEASUREMENTS TAKEN WITH A 1 MEG RESISTOR IN SERIES WITH THE METER.
5. READINGS FOR V101 AND V201 TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION.
6. CAPACITOR C123 IS CONNECTED TO POSITION 1 AS SHIPPED FROM THE FACTORY. CONNECT TO POSITION 2 IF GREATER AUDIO SENSITIVITY IS REQUIRED. REFER TO THE TRANSMITTER INSTRUCTIONS FOR FURTHER DETAILS.
7. GROUND CONNECTION IN V101 CATHODE CIRCUIT USED ON SINGLE FREQUENCY MODELS ONLY.
8. DASHED CIRCUITRY AND 200 SERIES COMPONENTS ARE INCORPORATED ON TWO FREQUENCY MODELS ONLY.
9. FOR 25 WATTS RF OUTPUT
   B+ VOLTAGE: 270V
   PA SCREEN VOLTAGE: 270V
   B++ (HI B+) VOLTAGE: 395V
   OSC. VOLTAGE: 150V
   BIAS VOLTAGE: -20V
   FOR 10 WATTS RF OUTPUT
   B+ VOLTAGE: 270V
   PA SCREEN VOLTAGE: 270V
   B++ (HI B+) VOLTAGE: 345V
   OSC. VOLTAGE: 150V
   BIAS VOLTAGE: -17V

REVISIONS

DIAG. ISSUE	CHASSIS SUFFIX	REF. SYMBOL	CHANGE	LOCATION
A	TTD1000AA TTD1000AB	C105	WAS 3.3 UUF	GRID OF V102A
B	TTD1000AA-1 TTD1000AB-1	R103	WAS 22K	GRID OF V101



NOTES:

1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ±10%, 1/2 WATT. K = 1000 OHMS.
   CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. LEGEND: IRON CORE ADJUSTMENTS:
   TOP TUNING ↑ BOTTOM TUNING ↓ TOP AND BOTTOM TUNING ↕
3. ALL MEASUREMENTS TAKEN WITH A VACUUM TUBE VOLTMETER WITH RESPECT TO GROUND.
4. ALL VOLTAGE MEASUREMENTS TAKEN WITH A 1 MEG RESISTOR IN SERIES WITH THE METER.
5. READINGS FOR V101 AND V201 TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION.
6. CAPACITOR C123 IS CONNECTED TO POSITION 1 AS SHIPPED FROM THE FACTORY. CONNECT TO POSITION 2 IF GREATER AUDIO SENSITIVITY IS REQUIRED. REFER TO THE TRANSMITTER INSTRUCTIONS FOR FURTHER DETAILS.
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   B+ VOLTAGE: 270V
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   OSC. VOLTAGE: 150V
   BIAS VOLTAGE: -20V
   FOR 10 WATTS RF OUTPUT
   B+ VOLTAGE: 270V
   PA SCREEN VOLTAGE: 270V
   B++ (HI B+) VOLTAGE: 345V
   OSC. VOLTAGE: 150V
   BIAS VOLTAGE: -17V

MODEL TABLE

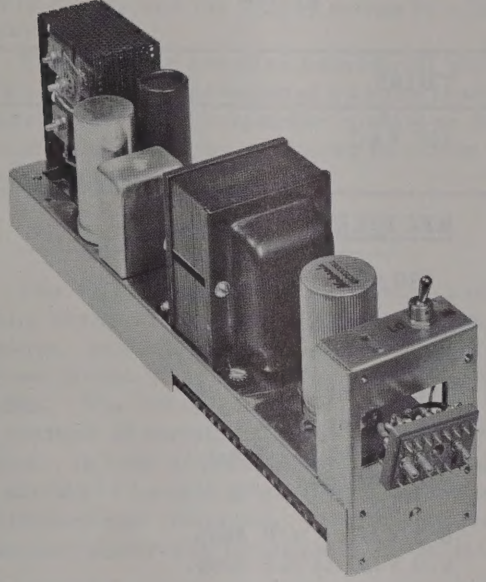
MODEL	CHANNELS
TTD-1000 AA-2	1-FREQUENCY
TTD-1000 AB-2	1-FREQUENCY

Transmitter
Schematic Diagram
Motorola No. 63E856736-C
1/15/60-CP

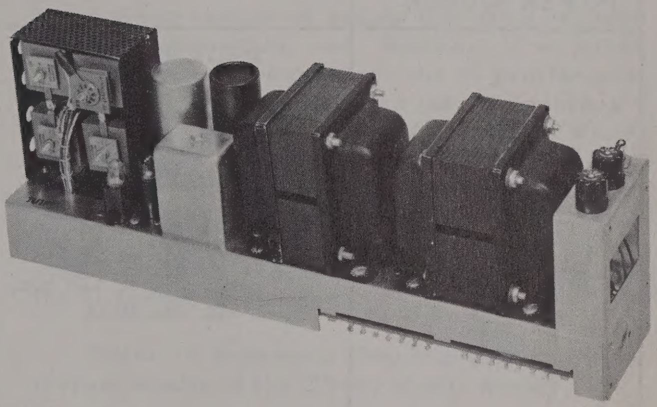
POWER SUPPLY CHASSIS

#10323-6

MC767



MODEL TU117



MODEL TU189

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU117	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, trunk mounting mobile stations.
TU117-F	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, front mounting mobile stations.
TU189	117 VAC	Single- or two-frequency, 25-30 watt, AC Utility Stations.

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PARTS LIST for Transmitter Diagram 63E856736-C (Rev.)

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed; uuf; 500 vdcw unless otherwise stated
C1		NOT USED
C2		NOT USED
C3	21B801139	.01 uf +80-20%; 600 vdcw
C4		same as C3
C5		same as C3
C6		same as C3
C7	21K852259	feed-thru; 18 ±5%
C8	21K851767	feed-thru; 18 ±5%
C9	21R124554	22 ±5%
C10	21K840850	4 ±.5 uuf
C11	21K840847	5 ±.5 uuf
C101	19K859115	variable; 3-32
C102	21K859119	10 ±.5 uuf
C103		same as C3
C104	21K848156	30 ±5%
C105	21K840848	6 ±.5 uuf
C106	21B800801	1500 GMV +100% max
C107	23K892117	elec; consists of:
C107A		20 uf +50-10%; 450 vdcw
C107B		△ 10 uf +50-10%; 450 vdcw
C107C		□ 10 uf +100-10%; 25 vdcw
C108	21K840046	100 ±10%
C109		same as C106
C110		same as C3
C111		same as C3
C112		same as C106
C113		same as C106
C114	21A112247	250 ±10%; 850 vdcw
C115	21A824948	500 +20-10%; 600 vdcw
C116		same as C3
C117		same as C114
C118		same as C114
C119	19K800032	variable; 2.6-19.7
C120	21K835358	15 ±10%
C121		NOT USED
C122		same as C115
C123		same as C3
C124	19B858032	variable 5.5-33.5
C125		same as C119
C126	23K890624	elec; 5 uf +100-15%; 150 vdcw
C127	21B401029	.02 uf +80-20%; 600 vdcw
C128		same as C127
C129		same as C3
C130	21K859773	2500 ±5%
C131	21K848158	390 ±10%; 300 vdcw
C132		same as C127
C133	21R410115	220 ±20%
C134	21K840047	150 ±5%
C135		NOT USED
C136	21K840850	4 ±.5 uuf
C137		same as C136
C138		NOT USED
C139		same as C3
C140		same as C127
C141		same as C106
C201		same as C101
C202		same as C102
C203		same as C134
C204	23K857384	elec; 5 uf +100-10%; 150 vdcw
C205		same as C204
C206		NOT USED
C207		same as C106
C208		same as C106
		CONNECTOR, receptacle: female;
J101	9A87120	single contact; round molded mica filled base; chassis mounted
J102		same as J101
J103	9B880881	11 contact; polarized; round molded black phenolic base; saddle mounted
		RELAY, armature:
K101	59K842298	6 v d-c; contact arrangement, 1 form "C" coil resistance 30 ohms ±1.5 ohms
		NOTE Relay K101 is mounted inside 1V840693 ASSEMBLY, shield (includes J101, J102,); shield assembly must be ordered separately
		COIL, RF:
L1		NOT USED
L2	1V835418	Doubler Driver Plate; includes C119
L3	24K865115	choke: 1.3 uh; coded BLU dot
L4	1V859750	Power Amplifier Grid
L5	24A858031	Power Amplifier Plate; includes L6
L6		same as L3
L7	24A852574	Filter; .1 uh
L101	24K864763	choke; 5.7 mh; coded BRN-YEL
L102		NOT USED
L103	24K865116	choke; 100 uh; coded BLU dot; Modulator
L104		same as L3
L105	24A858093	Antenna Pick-up Loop
L106	24B835395	2nd Doubler Plate; base stamped AA7; includes 1V835422 CORE, adjustable tuning; and clip; coded BLUE dot
L107	24K835396	2nd Doubler Grid; base stamped AA8; includes 1V835422 CORE, adjustable tuning; and clip; coded BLUE dot
L108		NOT USED
L201		same as L101
		COIL, AF:
L109	25D850636	choke; 6 henries
		RESISTOR, fixed: composition; ±10%; 1/2 w; ins. unless otherwise stated
R1	6R5577	2.7K
R2	6R6031	100K
R3	6R2028	2.2K ±5%
R4		same as R1
R5		same as R2
R6	6R6411	1K ±5%
R101	6R5631	120K
R102	6R6411	1K ±5%
R103	6R2089	1.8K
R104	6R5734	18K; 1 w
R105	6R6048	47K
R106		same as R102
R107	6R6229	1K
R108		same as R2
R109	6R6432	270 ohm
		RESISTOR, (cont'd)
R110		same as R2
R111		same as R105
R112	6R401017	1.8 meg ±5%
R113	6R6434	27K
R114	6R6341	22K; 1 w
R115		same as R105
R116	6R2073	2.2 meg ±5%
R117	6R120638	330 ohm ±5%
R118	6R5645	150 ohm ±5%
R119	6R6407	220K
R120	6R2068	33K ±5%
R121	6R6269	820 ohm
R122	6R6080	4.7K
R123	6R2061	180
R124	6R6475	680K
R125	6R5779	1.2 meg
R126		same as R124
R127		same as R2
R128	6R5766	12K; 2 w
R129		same as R128
R130	18K812998	variable: 300K ±20%; 1/4 w
R131	17K892469	wire wound; 4 ohm ±2%; 1 w
	or17B821901	wire wound; 4 ohm ±2%; 3 w
R132		NOT USED
R133		same as R119
R134		NOT USED
R135	6R6327	1K; 1 w
R201		same as R101
R202		same as R102
R203	6R6326	100 ohm
R204		same as R203
		TRANSFORMER, RF:
T1	24B835397	1st Doubler; base stamped AA5; includes; 1V87207 CORE, adjustable tuning; and palnut 1V87208 CORE, adjustable tuning; and clip Reference parts C3, C4, C10, C11, R1, R2, R3
T2	24K861145	Tripler; base stamped BF9; includes: 1V87207 CORE, adjustable tuning; and palnut 1V87208 CORE, adjustable tuning; and clip Reference parts C5, C6, C7, R4, R5, R6
		TUBE, electron:
V101	195T147A03	type 6CB6
V102	195T113A01	type 12AT7
V103		same as V101
V104	195T171A01	type 6AK6
V105	197T102A01	type 2E26
V106	197T109A01	type 6146
V107	195T175A01	type 6BH6
V108	195T111A03	type 6AL5
V201		same as V101
		SOCKET, tube: female;
XV101	9K87124	7 contact; miniature; molded mica filled phenolic base; includes center shield; saddle mounting
XV102	9B881243	9 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV103		same as XV101
		SOCKET, (cont'd)
XV104		same as XV101
XV105	9B890001	8 contact; brown bakelite wafer base; saddle mounting
XV106		same as XV105
XV107	9B834083	7 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV108		same as XV107
XV201		same as XV101
		SOCKET, crystal: female;
XY101	9K857508	4 contact; square molded black bakelite base; chassis mounted
XY201		same as XY101

CRYSTAL

NOTE

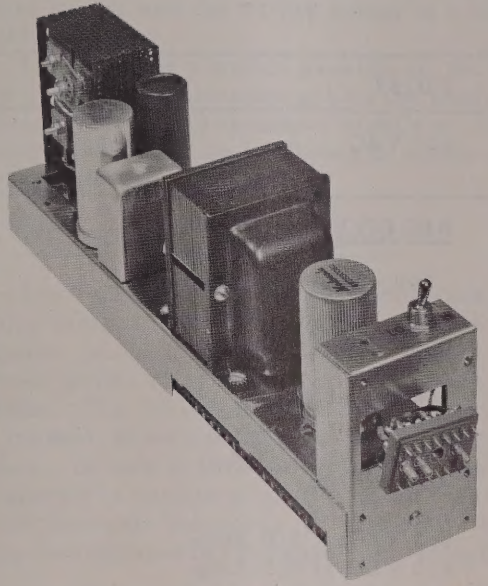
When ordering a Transmitter Chassis only, crystals must be ordered separately. Crystal type number and operating frequency must be specified when ordering crystal.

Y101	Type RN1	CRYSTAL UNIT, quartz: assembly; includes 6 volt heater element and thermostat

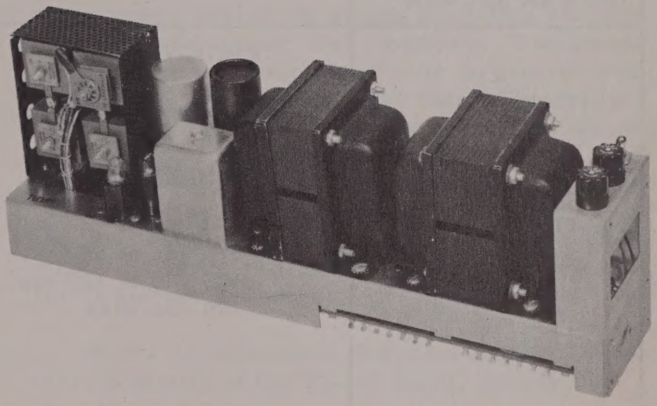
#10323-6

MC767

POWER SUPPLY CHASSIS



MODEL TU117



MODEL TU189

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU117	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, trunk mounting mobile stations.
TU117-F	6.3 VDC or 12.6 VDC	Single- or two-frequency, 25-30 watt, front mounting mobile stations.
TU189	117 VAC	Single- or two-frequency, 25-30 watt, AC Utility Stations.

MOTOROLA INC. COMMUNICATIONS DIVISION

Engineering Publications *4501 W. Augusta Blvd.* *Chicago 51, Illinois*

NOMINAL PERFORMANCE SPECIFICATIONS

BASIC UNITS	TU117, TU117-F	TU189
PRIMARY POWER SOURCE	6.3 VDC or 12.6 VDC	117 VAC
VOLTAGE RATINGS	RECEIVER: 190 vdc at 70 ma. TRANSMITTER: 150 vdc at 18 ma. 275 vdc at 55 ma. 425 vdc at 123 ma. -20 vdc Bias	RECEIVER: 190 vdc at 70 ma. TRANSMITTER: 150 vdc at 18 ma. 275 vdc at 55 ma. 425 vdc at 123 ma. -20 vdc Bias 6.3 VAC at 7.0 Amp. 6.0 VDC at 0.5 Amp.
DIMENSIONS	15" long x 3" wide x 5-1/4" high	15" long x 3" wide x 5-1/4" high
WEIGHT	9-1/2 lbs.	14 lbs.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DESCRIPTION

To provide maximum flexibility, the power supplies intended for universal mobile installations are designed for operation from either a 6 or 12 VDC primary power source. The Models TU117 and TU117-F are for trunk and front mounting vehicular installations respectively. Also available, for AC utility equipment, is the Model TU189 which operates from a 117 VAC primary power source.

All models are of strip design and mount in the standard MOTOROLA mobile housings. The TU117 Series and the TU189 mount in a 10" wide housing.

These power supplies provide all the necessary voltages for operation of both the transmitter and receiver of the respective mobile or AC utility station and may be employed in either single- or two-frequency operation.

a. TU117 Series Power Supplies

The TU117 Series Power Supplies are specifically designed for operation with 25 watt mobile stations. Model TU117 is for trunk mount installations; Model TU117-F is for front mount installations. The TU117 and TU117-F differ only in the method of terminating the power and control cables. In both of these models, a single vibrator circuit is used to provide both the transmitter and receiver B+ voltages. A "transmit-receive" relay is employed to facilitate push-to-talk operation of the transmitter from the control head. This relay is normally in the "receive" condition and is actuated by operation of the microphone or handset push-to-talk switch. Actuation of the relay removes the receiver operating voltages and switches high voltage to the transmitter, placing the transmitter in operating condition. A HI-LOW switch is incorporated on the chassis to permit reduction of the power amplifier screen voltage. The "Low" position should be used when aligning the transmitter.

Refer to the applicable schematic diagrams for circuit details of each model.

b. TU189 Power Supply (117 VAC Operation)

The TU189 Power Supply is specifically designed for use with AC utility station equipment. This unit operates from a 117 volt, 60 cycle primary power source to supply operating voltages for the transmitter and receiver. Two power transformers are employed; one to provide control and filament voltages for the equipment, the other to provide transmitter and receiver B+, as well as bias voltages. The TU189 employs a "transmit-receive" relay to facilitate push-to-talk functions. A HI-LOW switch connected in the transmitter power amplifier screen voltage supply permits reduction of the screen voltage for alignment purposes.

Refer to Schematic Diagram 63D835279 for circuit details of the TU189 Power Supply.

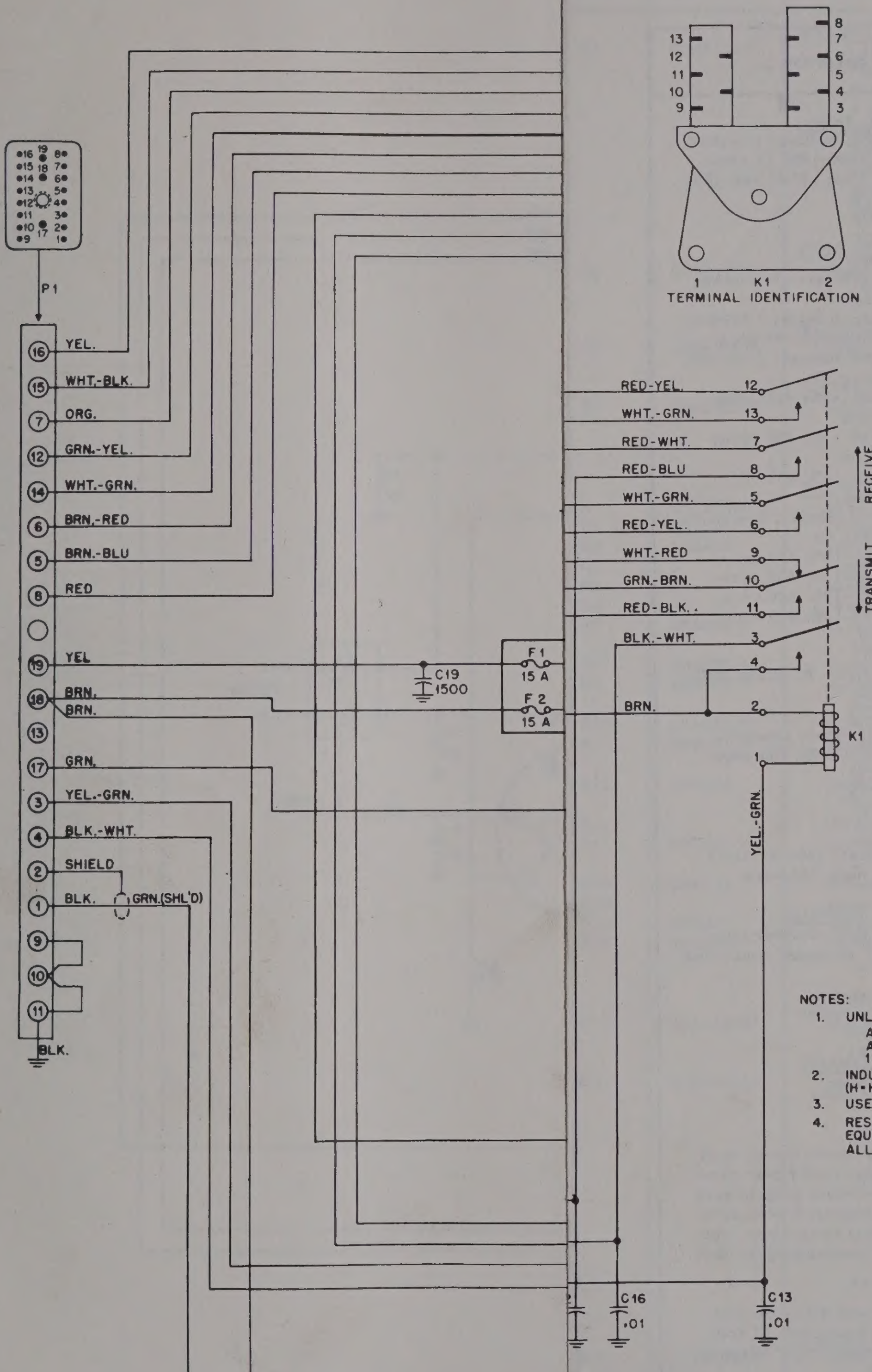
SERVICE NOTE

In the TU117 and TU117-F Power Supplies, the 15 ampere (slow blow) fuses may open when the equipment is used in climates having a constant high temperature. This may occur in either 6-volt or 12-volt installations.

The same may sometimes be experienced in 12-volt installations (only) due to excessive voltage in the vehicle electrical system.

If this occurs, replace the 15 ampere fuses with 20 ampere "fast blow" fuses.

Be sure to change back to the original fuses whenever the abnormal conditions no longer exist.



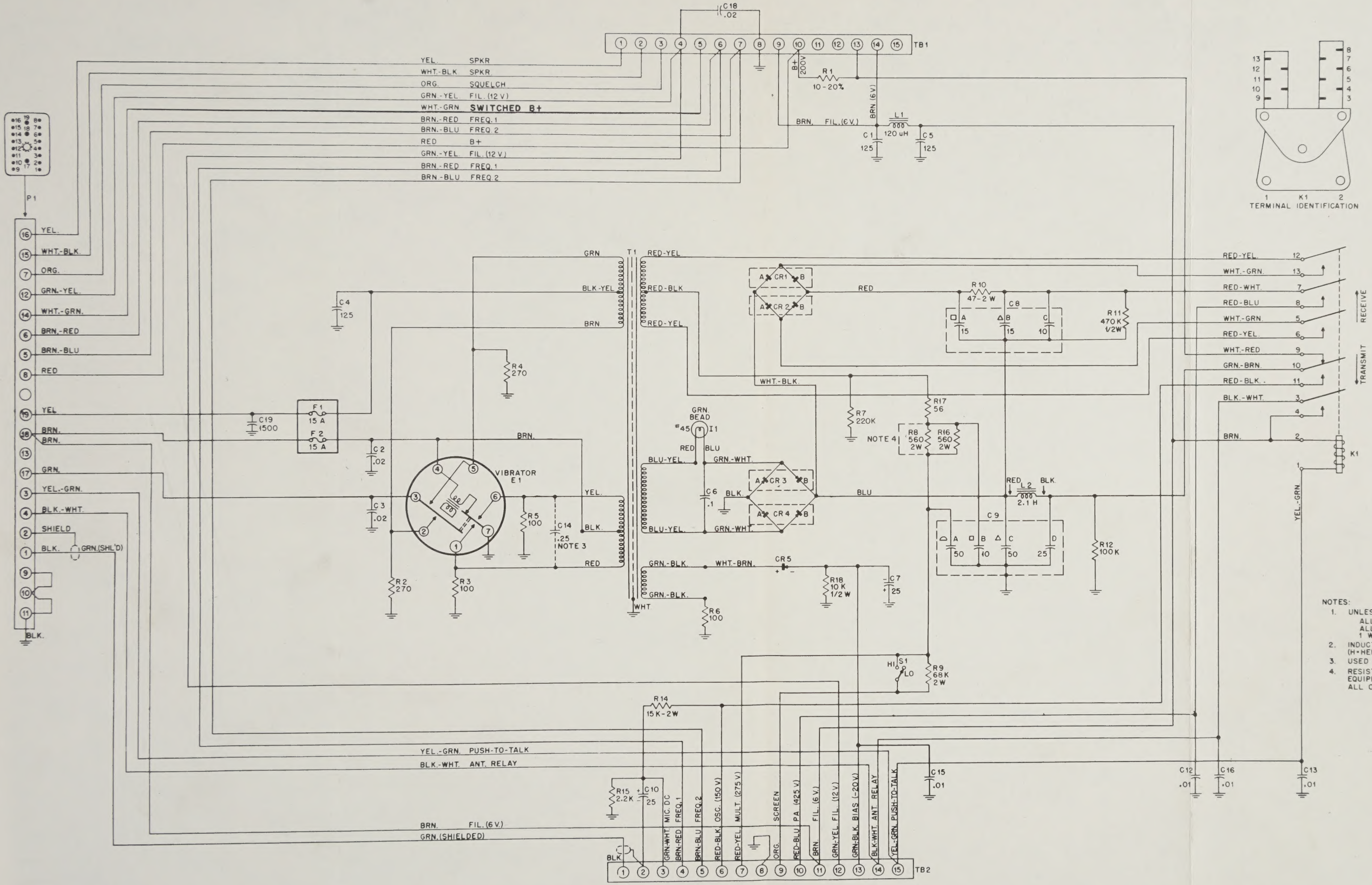
MODEL TABLE

MODEL	DESCRIPTION
TU117-18	VIBRATOR POWER SUPPLY

NOTES:

1. UNLESS OTHERWISE STATED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
   ALL RESISTOR VALUES ARE IN OHMS, ±10%, 1 WATT. (K=1000 OHMS)
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)
3. USED ONLY FOR SPLIT CHANNEL RECEIVER OPERATION.
4. RESISTORS R8 & R16 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.

TU117 Power Supply
Schematic Diagram
Motorola No. 63E831716-V
1/15/60-CP



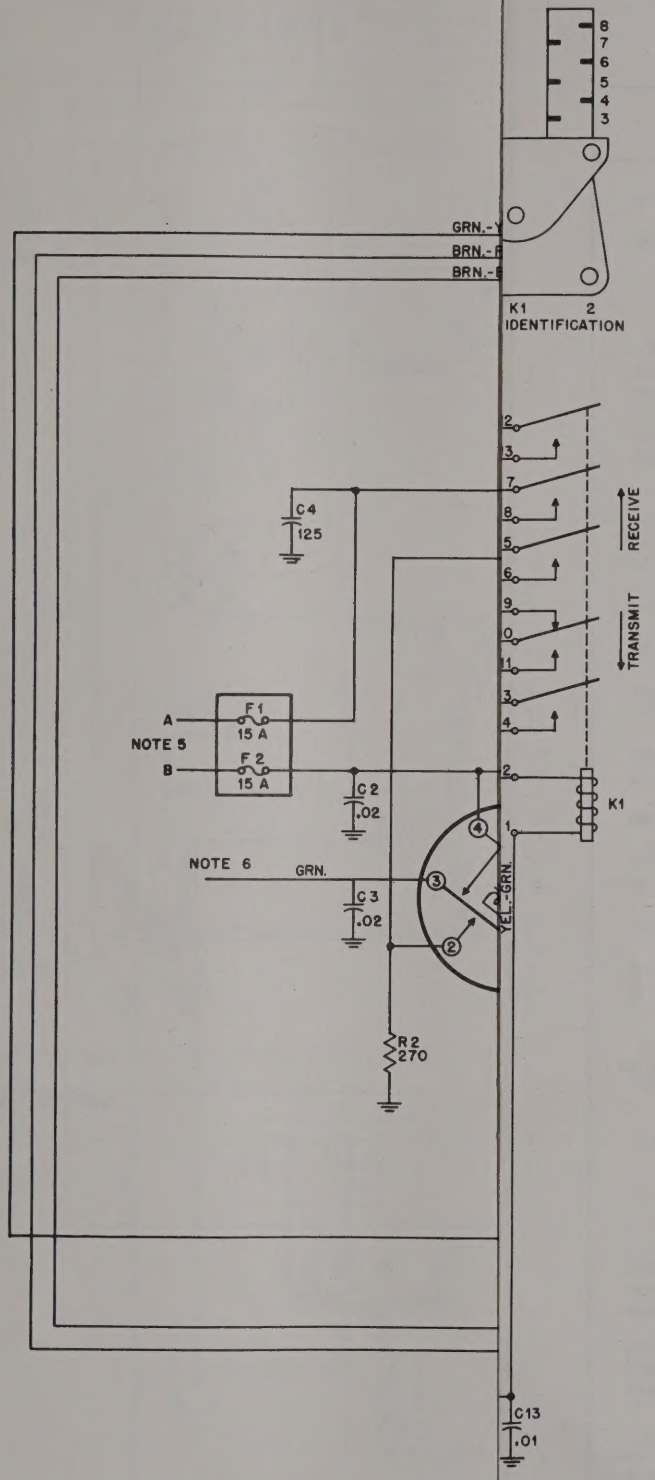
MODEL TABLE

MODEL	DESCRIPTION
TU117-18	VIBRATOR POWER SUPPLY

NOTES:
1. UNLESS OTHERWISE STATED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
   ALL RESISTOR VALUES ARE IN OHMS, ±10%,
   1 WATT. (K=1000 OHMS)
2. INDUCTANCE VALUES ARE AS INDICATED.
   (H=HENRIES & uH=MICROHENRIES)
3. USED ONLY FOR SPLIT CHANNEL RECEIVER OPERATION.
4. RESISTORS R8 & R16 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.

TU117 Power Supply
Schematic Diagram
Motorola No. 63E831716-V
1/15/60-CP

MOTOROLA PART No.	DESCRIPTION
	FUSEHOLDER,
31K835455	dual fuse mounting; for 1-1/4" long x 1/4" diameter fuses
	LAMPHOLDER,
9A813001	miniature; single contact; molded phenolic bayonet base; includes BLU and RED coded, 4" leads



MODEL TABLE

MODEL	DESCRIPTION
TU117 - 12	VIBRATOR POWER SUPPLY

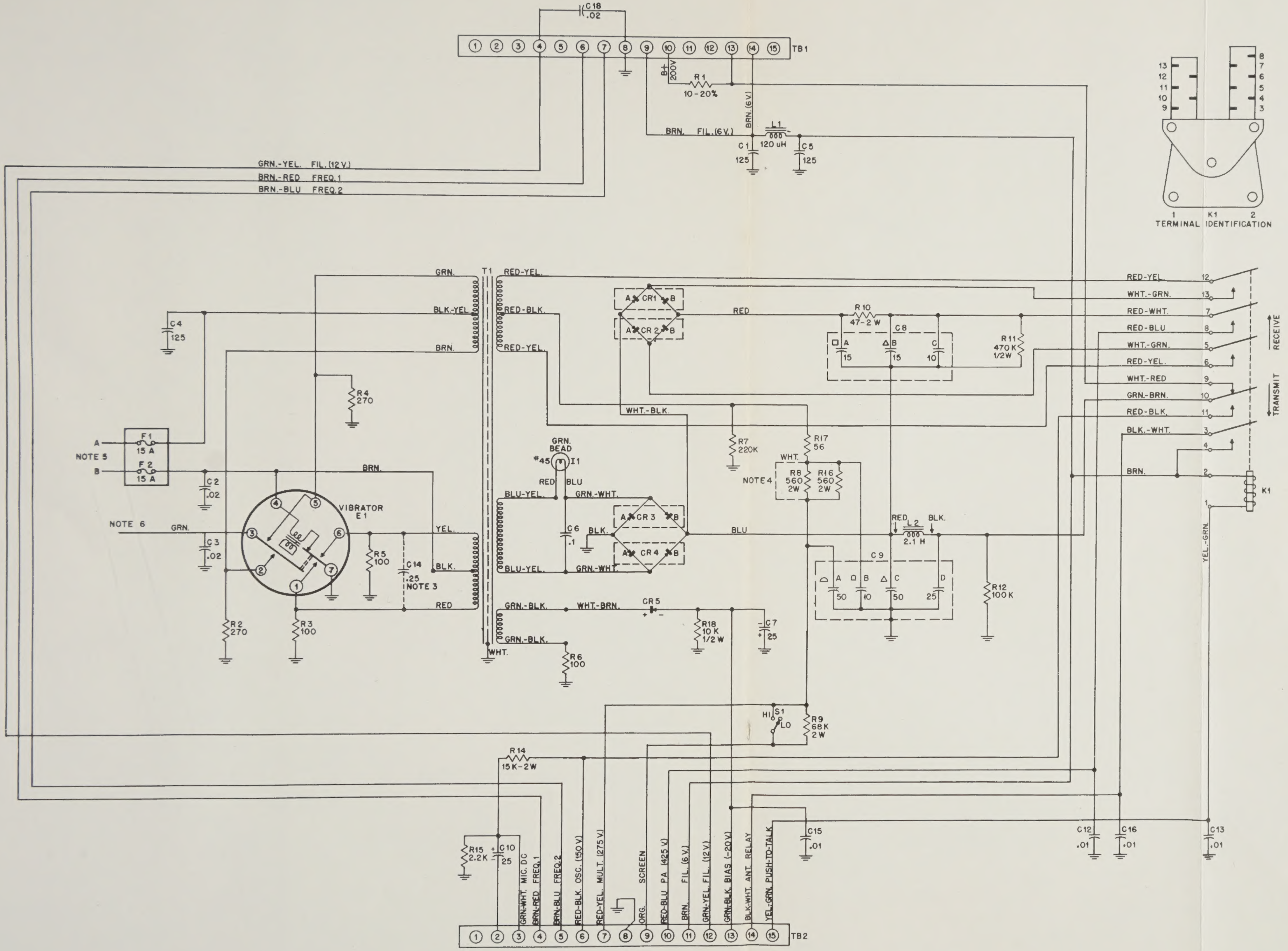
NOTES:

1. UNLESS OTHERWISE STATED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
   ALL RESISTOR VALUES ARE IN OHMS, ±10%,
   1 WATT. (K=1000 OHMS)
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)
3. USED ONLY FOR SPLIT CHANNEL RECEIVER OPERATION.
4. RESISTORS R8 & R16 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.
5. POINTS A & B CONNECT TO 6 OR 12 V DC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
6. CONNECTS TO PIN 8 OF POWER INPUT PLUG.

TU117-F Power Supply
Schematic Diagram
Motorola No. 63E835298-P
1/15/60-CP

PARTS LIST for Schematic Diagram 63E831716-V

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed:
C1	23K840707	electrolytic; tubular; 1 section 125 uf +100-10%; 16 vdcw
C2	21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw
C3		same as C2
C4		same as C1
C5		same as C1
C6	8K831678	oil filled; tubular; .1 uf ±10%; 1000 vdcw
C7	23K850516	electrolytic; tubular; 1 section; 25 uf +100-10%; 50 vdcw
C8	23K890002	electrolytic; tubular; 3 section; consisting of:
C8A		□ 15 uf +50-10%; 450 vdcw; section
C8B		△ 15 uf +50-10%; 450 vdcw; section
C8C		10 uf +50-10%; 450 vdcw; section
C9	23K857835	electrolytic; tubular; 4 section; consisting of:
C9A		⌓ 50 uf +50-10%; 450 vdcw
C9B		□ 10 uf +50-10%; 450 vdcw
C9C		△ 50 uf +50-10%; 300 vdcw
C9D		25 uf +50-10%; 300 vdcw
C10		same as C7
C11		NOT USED
C12	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C13		same as C12
C14	8K837041	metallized; paper; tubular; .25 uf +30-20%; 200 vdcw
C15		same as C12
C16		same as C12
C17		NOT USED
C18		same as C2
C19	21B800801	ceramic; disc; 1500 uuf GMV +100%; max; 500 vdcw
		RECTIFIER, metallic:
CR1	48C800715	selenium; dual; doubler type; 2 series sections; consisting of:
CR1A		8 plate section
CR1B		8 plate section
CR2		same as CR1
CR3		same as CR1
CR4		same as CR1
CR5	48A800116	selenium; 1 plate
		VIBRATOR,
E1	48C830082	non-synchronous: 6 volt; split reed; dual interrupter type; male 7 contact plug-in base
	or 48C847730	non-synchronous: 6 volt; split reed; dual interrupter type; male 7 contact plug-in base
		FUSE,
F1	65K804906	cartridge: one time; slo-blo; glass; 15 ampere; 32 volt; 1-1/4" long x 1/4" diameter
F2		same as F1
		LAMP, incandescent:
I1	65K831645	3.2 volt; .35 ampere; tubular glass; single contact miniature bayonet base; green bead
		RELAY, armature:
K1	80K831612	6 v dc; 2 stack; contact arrangement; 1st stack, 1 form "A" and 1 form "C"; 2nd stack, 3 form "A"; does not include 15K848892 COVER, relay or 7A811735 BRACKET, relay cover mounting; cover and bracket must be ordered separately
		COIL, RF:
L1	24A812763	choke: 120 microhenries at 1000 cycle
		REACTOR,
L2	25B837416	filter: 2.1 henries at 100 ma
		CONNECTOR, plug:
P1	28C802820	male; 19 contact; polarized; rectangular; molded mica filled plastic base; cable mounted
		RESISTOR, fixed:
R1	6R118205	carbon; 10 ohm ±20%; 1 w; ins.
R2	6R6336	carbon; 270 ohm ±10%; 1 w; ins.
R3	6R6415	carbon; 100 ohm ±10%; 1 w; ins.
R4		same as R2
R5		same as R3
R6		same as R3
R7	6R5574	carbon; 220,000 ohm ±10%; 1 w; ins.
R8	6R488036	carbon; 560 ohm ±10%; 2 w; ins.
R9	6R2079	carbon; 68,000 ohm ±10%; 2 w; ins.
R10	6R488035	carbon; 47 ohm ±10%; 2 w; ins.
R11	6R6377	carbon; 470,000 ohm ±10%; 1/2 w; ins.
R12	6R6328	carbon; 100,000 ohm ±10%; 1 w; ins.
R13		NOT USED
R14	6R5732	carbon; 15,000 ohm ±10%; 2 w; ins.
R15	6R6409	carbon; 2200 ohm ±10%; 1 w; ins.
R16		same as R8
R17	6R2037	carbon; 56 ohm ±10% ; 1 w; ins.
R18	6R6320	carbon; 10,000 ohm ±10%; 1/2 w; ins.
		SWITCH,
S1	40A482097	toggle: S.P.S.T.
		TRANSFORMER,
T1	25D830215	power: vibrator; includes: primary #1 leads: GRN, BRN and BLK-YEL center tap primary #2 leads: YEL, RED and BLK center tap secondary #1 leads: RED-YEL, RED-YEL and RED-BLK center tap secondary #2 leads: BLU-YEL, BLU-YEL secondary #3 leads: GRN-BLK, GRN-BLK
		BOARD, terminal:
TB1	31B802699	14 soldering lug terminals
TB2		same as TB1
		SOCKET, vibrator:
XE1	9A6776	female; 7 contact; round molded black bakelite base; saddle mounting
		FUSEHOLDER,
XF1, 2	31K835455	dual fuse mounting; for 1-1/4" long x 1/4" diameter fuses
		LAMPHOLDER,
XI1	9A813001	miniature; single contact; molded phenolic bayonet base; includes BLU and RED coded, 4" leads



MODEL TABLE

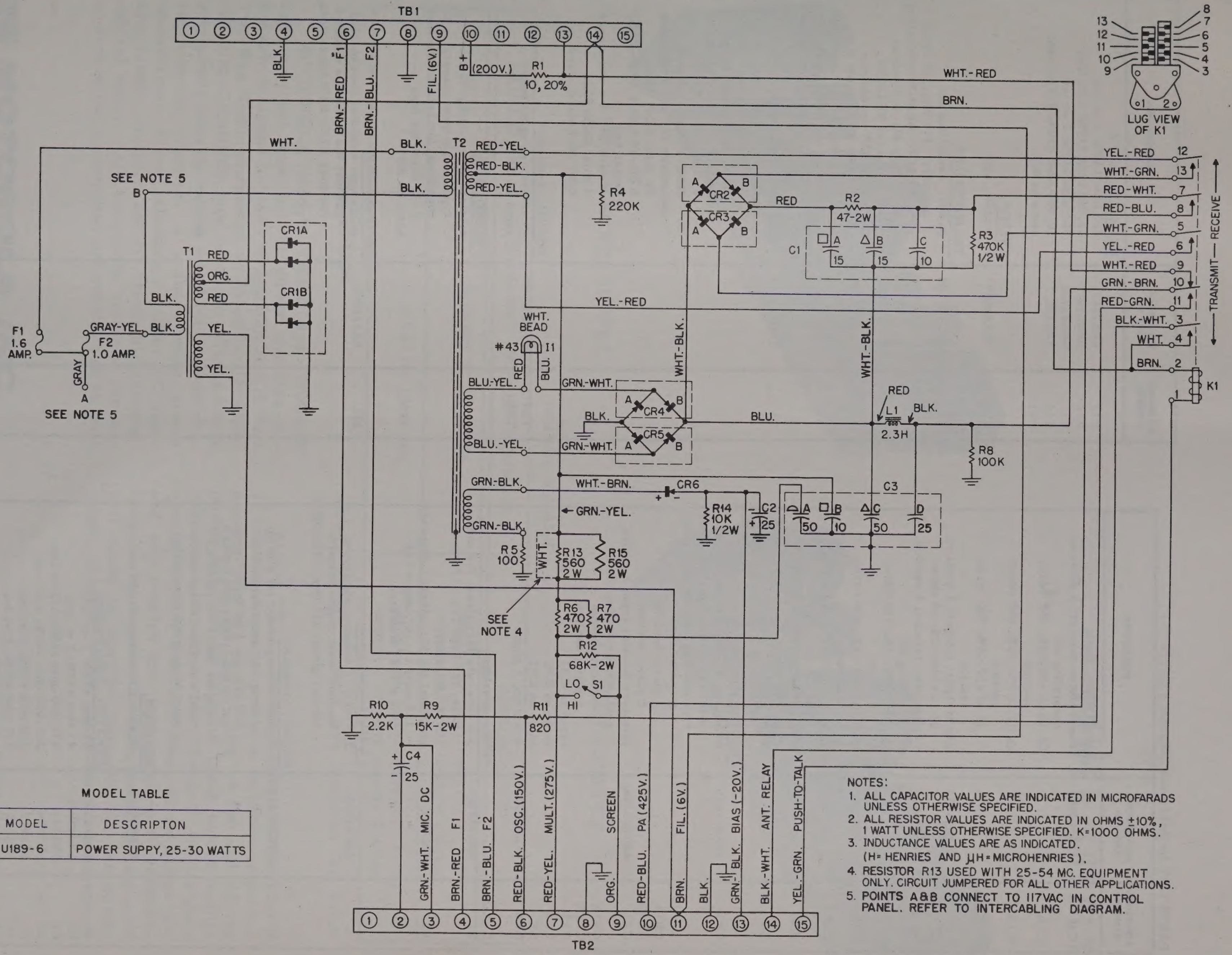
MODEL	DESCRIPTION
TU117-12	VIBRATOR POWER SUPPLY

NOTES:

1. UNLESS OTHERWISE STATED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
   ALL RESISTOR VALUES ARE IN OHMS, ±10%, 1 WATT. (K=1000 OHMS)
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)
3. USED ONLY FOR SPLIT CHANNEL RECEIVER OPERATION.
4. RESISTORS R8 & R16 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.
5. POINTS A & B CONNECT TO 6 OR 12 V DC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
6. CONNECTS TO PIN 8 OF POWER INPUT PLUG.

TU117-F Power Supply
Schematic Diagram
Motorola No. 63E835298-P
1/15/60-CP

MOTOROLA PART No.	DESCRIPTION
	LAMPHOLDER,
9A813001	Miniature; single contact; molded phenolic bayonet base; includes BLUE and RED coded, 4" long leads



MODEL TABLE

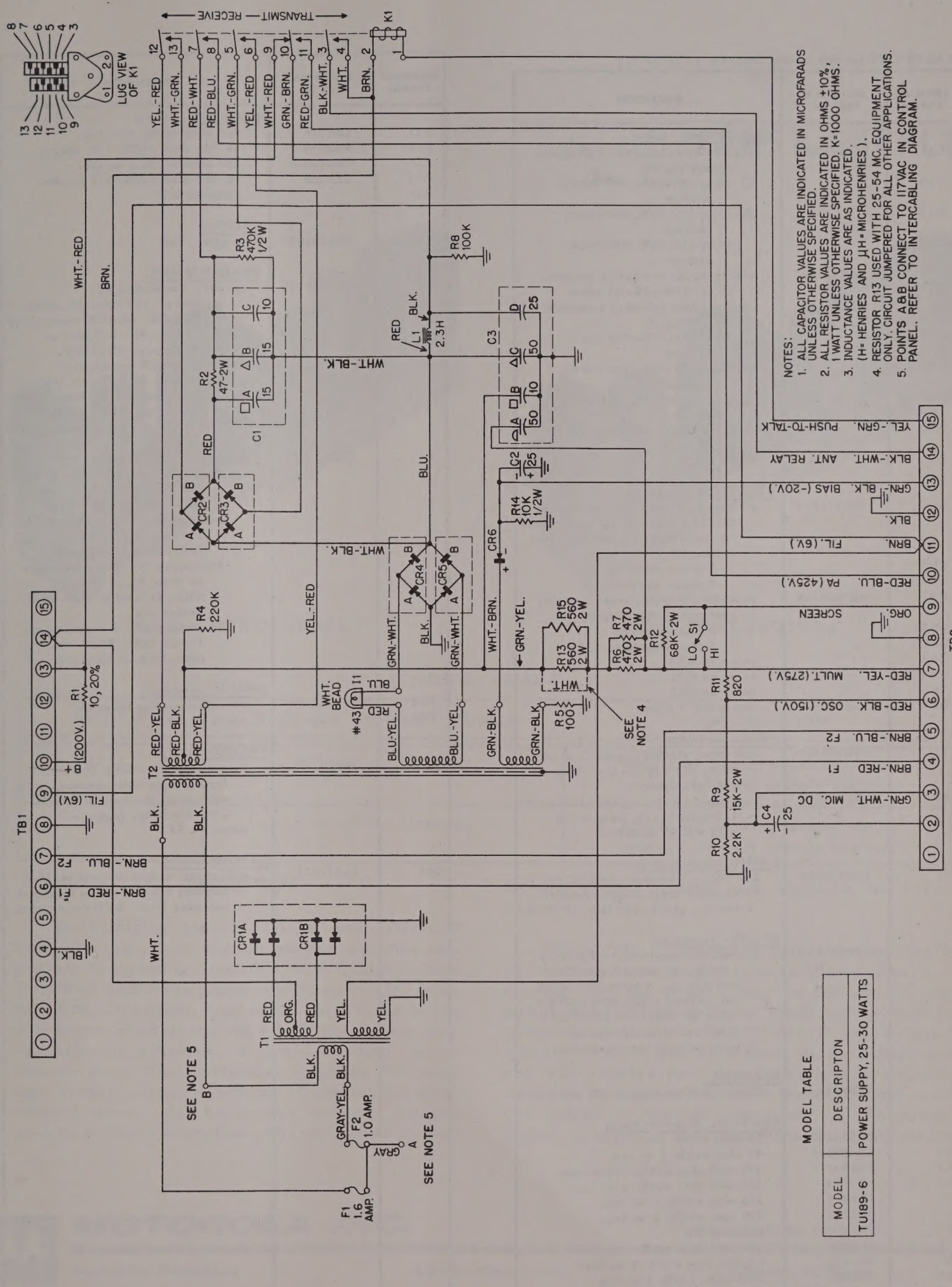
MODEL	DESCRIPTON
TU189-6	POWER SUPPY, 25-30 WATTS

NOTES:
1. ALL CAPACITOR VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS ±10%, 1 WATT UNLESS OTHERWISE SPECIFIED. K=1000 OHMS.
3. INDUCTANCE VALUES ARE AS INDICATED. (H= HENRIES AND μH=MICROHENRIES).
4. RESISTOR R13 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.
5. POINTS A&B CONNECT TO 117VAC IN CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.

TU189 A-C Power Supply
Schematic Diagram
Motorola No. 63D835279-F
1/15/60-CP

PARTS LIST for Schematic Diagram 63E835298-P

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed:
C 1	23K840707	electrolytic; tubular; 1 section 125 uf +100-10%; 16 vdcw
C 2	21B401029	ceramic; disc; .02 uf +80-20%; 600 vdcw
C 3		Same as C 2
C 4		Same as C 1
C 5		Same as C 1
C 6	8K831678	oil filled; tubular; .1 uf ±10%; 1000 vdcw
C 7	23K850516	electrolytic; tubular; 1 section; 25 uf +100-10%; 50 vdcw
C 8	23K890002	electrolytic; tubular; 3 section; consisting of:
C 8A		□15 uf +50-10%; 450 vdcw
C 8B		△15 uf +50-10%; 450 vdcw
C 8C		10 uf +50-10%; 450 vdcw
C 9	23K857835	electrolytic; tubular; 3 section; consisting of:
C 9A		△50 uf +50-10%; 450 vdcw
C 9B		□50 uf +50-10%; 450 vdcw
C 9C		△30 uf +50-10%; 300 vdcw
C 9D		25 uf +50-10%; 300 vdcw
C 10		Same as C 7
C 11		NOT USED
C 12	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C 13		Same as C 12
C 14	8K837041	metallized; paper; tubular; .25 uf +30-20%; 200 vdcw
C 15		Same as C 12
C 16		Same as C 12
C 17		NOT USED
C 18		Same as C 2
		RECTIFIER, metallic:
CR 1	48C800715	selenium; dual; doubler type; 2 series sections; consisting of:
CR 1A		8 plate section
CR 1B		8 plate section
CR 2		Same as CR 1
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5	48A800116	selenium; 1 plate
		VIBRATOR,
E 1	48C830082	Non-synchronous: 6 volt; split reed; dual interrupter type; male 7 contact plug-in base
	or 48C847730	Non-synchronous; 6 volt; split reed; dual interrupter type; male 7 contact plug-in base
		FUSE, Cartridge:
F 1	65K804906	one time; slo-blo; glass; 15 ampere; 32 volt; 1-1/4" long x 1/4" diameter
F 2		Same as F 1
		LAMP, incandescent:
I 1	65K831645	3.2 volt; .35 ampere; tubular glass; single contact miniature bayonet base; green bead
		RELAY, armature:
K 1	80K831612	6 vdc; 2 stack; contact arrangement; 1st stack, 1 form "A" and 1 form "C"; 2nd stack, 3 form "A"; does not include 15K848892 COVER, relay or 7A811735 BRACKET, relay cover mounting; cover and bracket must be ordered separately
		COIL, RF:
L 1	24A812763	Choke: 120 microhenries at 1000 cycle
		REACTOR,
L 2	25B837416	Filter: 2.1 henries at 100 ma.
		RESISTOR, fixed:
R 1	6R118205	carbon; 10 ohm ±20%; 1 w; ins.
R 2	6R6336	carbon; 270 ohm ±10%; 1 w; ins.
R 3	6R6415	carbon; 100 ohm ±10%; 1 w; ins.
R 4		Same as R 2
R 5		Same as R 3
R 6		Same as R 3
R 7	6R5574	carbon; 220,000 ohm ±10%; 1 w; ins.
R 8	6R488036	carbon; 560 ohm ±10%; 2 w; ins.
R 9	6R2079	carbon; 68,000 ohm ±10%; 2 w; ins.
R 10	6R488035	carbon; 47 ohm ±10%; 2 w; ins.
R 11	6R6377	carbon; 470,000 ohm ±10%; 1/2 w; ins.
R 12	6R6328	carbon; 100,000 ohm ±10%; 1 w; ins.
R 13	6R5598	carbon; 390 ohm ±10%; 1 w; ins.
R 14	6R5732	carbon; 15,000 ohm ±10%; 2 w; ins.
R 15	6R6409	carbon; 2200 ohm ±10%; 1 w; ins.
R 16		Same as R 8
R 17	6R2037	carbon; 56 ohm ±10%; 1 w; ins.
R 18	6R6320	carbon; 10,000 ohm ±10%; 1/2 w; ins.
		SWITCH,
S 1	40A482097	Toggle: S.P.S.T.
		TRANSFORMER,
T 1	25D830215	Power: vibrator; includes: primary #1 leads: GRN, BRN and BLK-YEL center tap primary #2 leads: YEL, RED and BLK center tap secondary #1 leads: RED-YEL, RED-YEL and RED-BLK center tap secondary #2 leads: BLU-YEL, BLU-YEL secondary #3 leads: GRN-BLK, GRN-BLK
		BOARD, terminal:
TB 1	31B802699	14 soldering lug terminals
TB 2		Same as TB 1
		SOCKET,
XE 1	9A6776	Vibrator: female; 7 contact; round molded black bakelite base; saddle mounting
		FUSEHOLDER,
XF 1, 2	31K835455	Dual fuse mounting; for 1-1/4" long x 1/4" diameter fuses
		LAMPHOLDER,
XI 1	9A813001	Miniature; single contact; molded phenolic bayonet base; includes BLUE and RED coded, 4" long leads



NOTES:
1. ALL CAPACITOR VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS ±10%, 1 WATT UNLESS OTHERWISE SPECIFIED. K=1000 OHMS.
3. INDUCTANCE VALUES ARE AS INDICATED. (H = HENRIES AND μH = MICROHENRIES).
4. RESISTOR R13 USED WITH 25-54 MC. EQUIPMENT ONLY. CIRCUIT JUMPERED FOR ALL OTHER APPLICATIONS.
5. POINTS A&B CONNECT TO 117VAC IN CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.

MODEL TABLE

MODEL	DESCRIPTON
TU189-6	POWER SUPPY, 25-30 WATTS

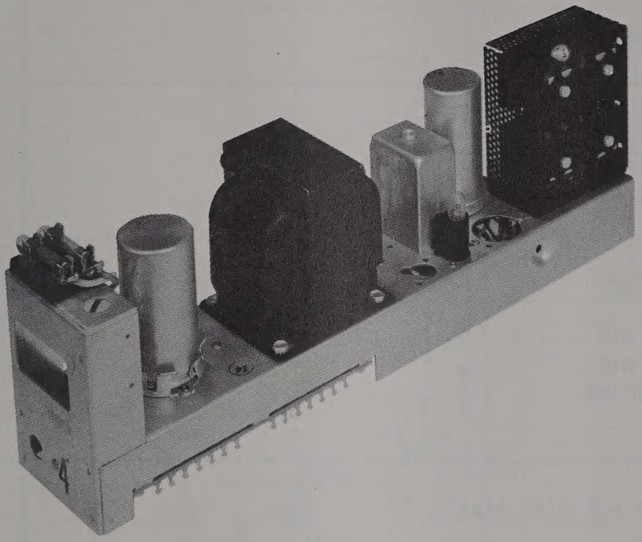
TU189 A-C Power Supply
Schematic Diagram
Motorola No. 63D835279-F
1/15/60-CP

PARTS LIST for Schematic Diagram 63D835279-F

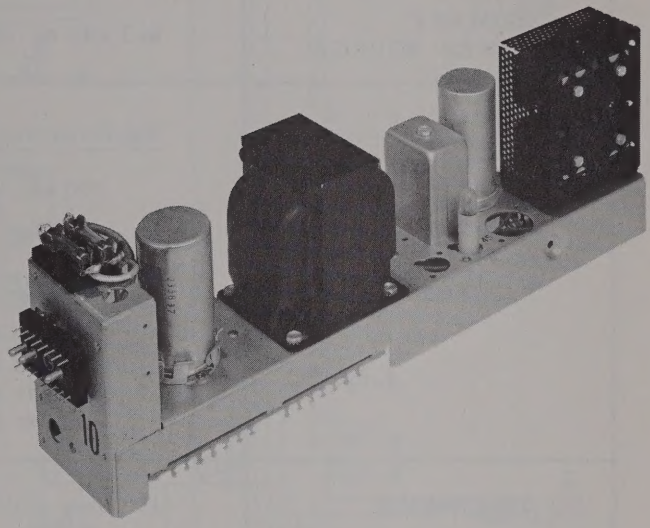
REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITORS, fixed:
C1	23K890002	electrolytic; tubular; 3 section; consisting of:
C1A		□ 15 uf +50-10%; 450 vdcw; section
C1B		△ 15 uf +50-10%; 450 vdcw; section
C1C		10 uf +50-10%; 450 vdcw; section
C2	23K483807	electrolytic; tubular; 1 section; 25 uf +100-10%; 25 vdcw
C3	23K851506	electrolytic; tubular; 4 section; consisting of:
C3A		⌓ 50 uf +50-10%; 450 vdcw; section
C3B		□ 10 uf +50-10%; 450 vdcw; section
C3C		△ 50 uf +100-10%; 300 vdcw; section
C3D		25 uf +100-10%; 300 vdcw; section
C4		same as C2
		RECTIFIER, metallic:
CR1	48K811619	selenium; 4 plate; full wave rectifier; 2 pairs of parallel plates connected series opposed; consisting of:
CR1A		2 plate; section
CR1B		2 plate; section
CR2	48C800715	selenium; dobuler type; 2 series sections; consisting of:
CR2A		8 plate; section
CR2B		8 plate; section
CR3		same as CR2
CR4		same as CR2
CR5		same as CR2
CR6	48A800116	selenium; 1 plate
		FUSE, cartridge:
F1	65K804909	one time; slo-blo; glass; 1.6 ampere; 125 volt; 1-1/4" long x 1/4" diameter
F2	65K804910	one time; slo-blo; glass; 1 ampere; 125 volt; 1-1/4" long x 1/4" long x 1/4" diameter
		LAMP, incandescent:
I1	65K810328	2.5 volt; .5 ampere; miniature bayonet base; single contact; tubular glass; #43 type
		RELAY, armature:
K1	80K831612	contact arrangement; 1st pile up, 1 form "A" and 1 form "C"; 2nd pile up, 3 form "A"; does not include 15K848892 COVER, relay or 7A811735 BRACKET, relay cover mounting; which must be ordered separately
		REACTOR,
L1	25B825358	Filter: 2.3 henries at 100 ma d-c
		RESISTOR, fixed; carbon;
R1	6R118205	10 ohm ±20%; 1 w; ins.
R2	6R488035	47 ohm ±10%; 2 w; ins.
R3	6R6377	470,000 ohm ±10%; 1/2 w; ins.
R4	6R5574	220,000 ohm ±10%; 1 w; ins.
R5	6R6415	100 ohm ±10%; 1 w; ins.
R6	6R2010	470 ohm ±10%; 2 w; ins.
R7		same as R6
R8	6R6328	100,000 ohm ±10%; 1 w; ins.
R9	6R5732	15,000 ohm ±10%; 2 w; ins.
R10	6R6409	2200 ohm ±10%; 1 w; ins.

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		RESISTOR, cont'd
R11	6R5701	820 ohm ±10%; 1 w; ins.
R12	6R2079	68,000 ohm ±10%; 2 w; ins.
R13	6R488036	560 ohm ±10%; 2 w; ins.
R14	6R6320	10,000 ohm ±10%; 1/2 w; ins.
R15		same as R13
		SWITCH,
S1	40A482097	toggle: spst
		TRANSFORMER,
T1	25C800144	power: consisting of: primary: 117 volt, 60 cycle BLACK, BLACK conductors secondary #1: 6.3 volt at 7 ampere; YELLOW, YELLOW conductors secondary #2: 16 volt at 2 amperes, 8 volt each side of center tap RED, RED with ORANGE center tap conductors
T2	25D835532	power: consisting of: primary: 117 volt, 60 cycle; d-c resistance 3.05 ohm; BLK, BLK conductors secondary #1: d-c resistance 25 ohm; BLU-YEL, BLU-YEL conductors secondary #2: d-c resistance 42 ohm; RED-YEL, RED-YEL with RED-BLK center tap secondary #3: d-c resistance 3 ohm; GRN-BLK, GRN-BLK conductors
		BOARD, terminal:
TB1	31B802699	14 soldering lug terminal
TB2		same as TB1
		FUSEHOLDER,
XF1	9B820279	single fuse mounting; female type; single hole chassis mounting; for 1-1/4" long x 1/4" diameter fuse
XF2		same as XF1
		LAMPHOLDER,
XI1	9A813001	miniature; single contact molded bayonet base; chassis mounted includes BLU, RED conductors

POWER SUPPLY



TU212-F POWER SUPPLY



TU212 POWER SUPPLY

MODEL CHART

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU212	6.3 vdc or 12.6 vdc	Single or two-frequency, trunk mount, 10 watt mobile station
TU212-F	6.3 vdc or 12.6 vdc	Single or two-frequency, front mount, 10 watt mobile station

DESCRIPTION

MOTOROLA Models TU212 and TU212-F are universal type mobile power supplies expressly designed for use with MOTOROLA 10 Watt Two-Way Radio equipment, utilizing the UNIVERSAL UNI-CHANNEL type receiver. These heavy duty power chassis include a dual interrupter non-synchronous vibrator, a multi-winding power transformer, three selenium rectifier DC voltage supply circuits and a "transmit-receive" control relay. All necessary voltages for operation of the transmitter and receiver of 10 watt mobile station models are supplied by these chassis.

Model TU212 Power Supply incorporates a 19 contact male receptacle to facilitate interconnection with the female plug on the end of the power and control cable of trunk mount mobile radio installations. The TU212-F is designed specifically for use with front mount equipment and will require that power and control connections be made directly from the equipment control panel to specific terminals on the power supply chassis. With exception of termination

MOTOROLA INC. COMMUNICATIONS DIVISION
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NOMINAL PERFORMANCE SPECIFICATIONS

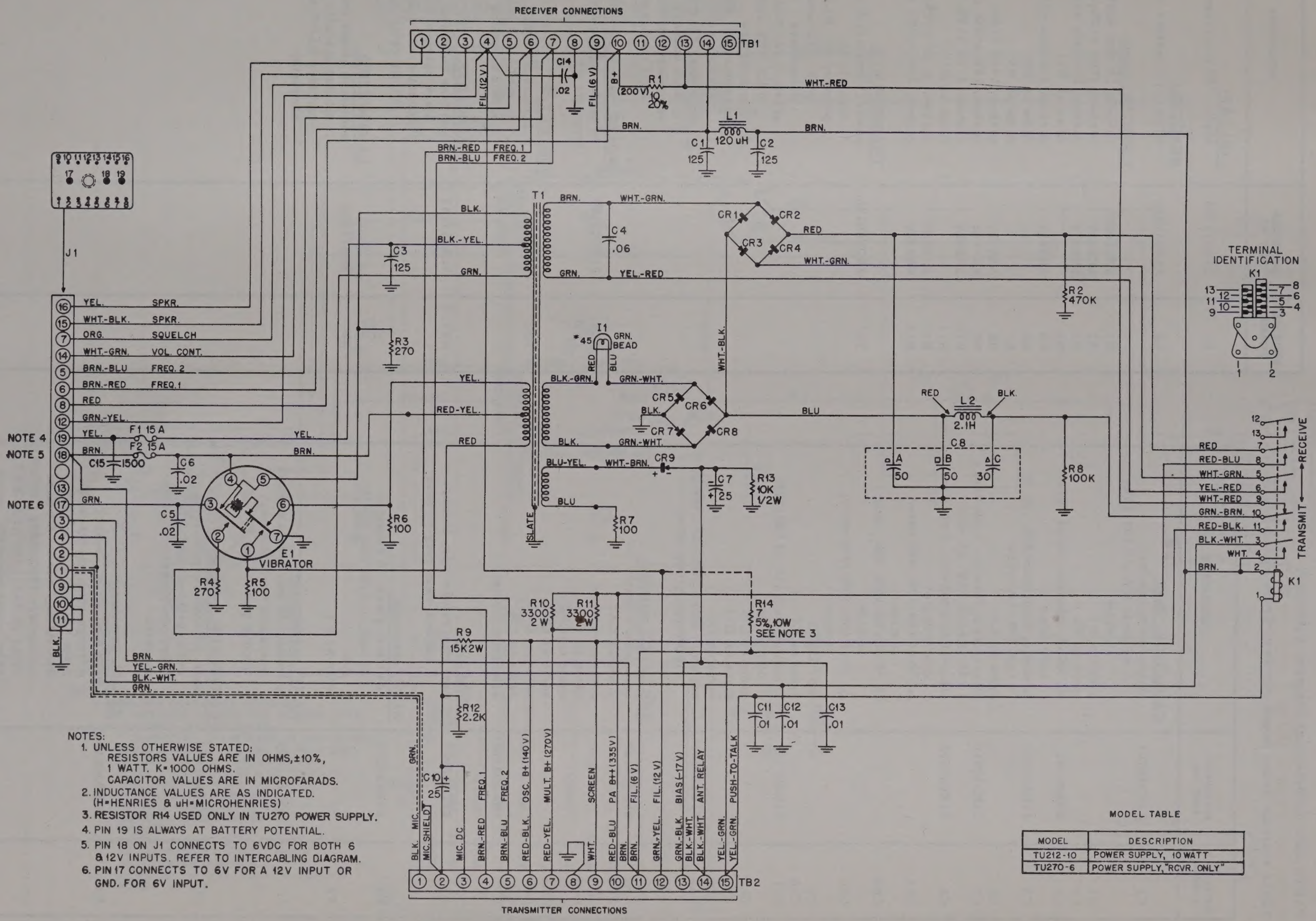
MODELS	TU212, TU212-F
PRIMARY POWER SOURCE	6.3 vdc or 12.6 vdc
VOLTAGE RATINGS	Receiver Section: 200 vdc at 75 ma Transmitter Section: 140 vdc at 15 ma 270 vdc at 40 ma 335 vdc at 120 ma -17 vdc Bias
DIMENSIONS	15" long x 3" wide x 5-1/4" high
WEIGHT	9 lb

facilities, the TU212 and TU212-F Power Supply Chassis are identical.

Universal design permits operation of these power supply chassis from either a 6.3 VDC or 12.6 VDC vehicular battery source and with either single or two-frequency mobile radio equipment. This diversified application is accomplished by use of an applicable cable kit and/or control unit to accommodate the desired operation.

Both the TU212 and TU212-F Power Supplies employ a single heavy duty type vibrator requiring a relatively low input power. The three selenium rectifier circuits provide transmitter high (B++) voltage (top circuit shown on diagram), transmitter/receiver B+ voltage (middle circuit), and transmitter bias voltage respectively. The filaments are supplied from a 6 volt bus when operating on a 6.3 VDC primary power source or from two independent 6 volt busses when operating on 12.6 VDC.

A "transmit-receive" relay is incorporated on these power supplies to facilitate "push-to-talk" operation of the mobile equipment from the control unit. All transmitter and receiver switching functions are performed by means of this relay. Power supply fusing is provided by two 15 ampere cartridge type fuses connected in the primary input circuit of the power supply chassis.



NOTES:
1. UNLESS OTHERWISE STATED:
   RESISTORS VALUES ARE IN OHMS, ±10%, 1 WATT. K=1000 OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)
3. RESISTOR R14 USED ONLY IN TU270 POWER SUPPLY.
4. PIN 19 IS ALWAYS AT BATTERY POTENTIAL.
5. PIN 18 ON J1 CONNECTS TO 6VDC FOR BOTH 6 & 12V INPUTS. REFER TO INTERCABLING DIAGRAM.
6. PIN 17 CONNECTS TO 6V FOR A 12V INPUT OR GND. FOR 6V INPUT.

MODEL TABLE

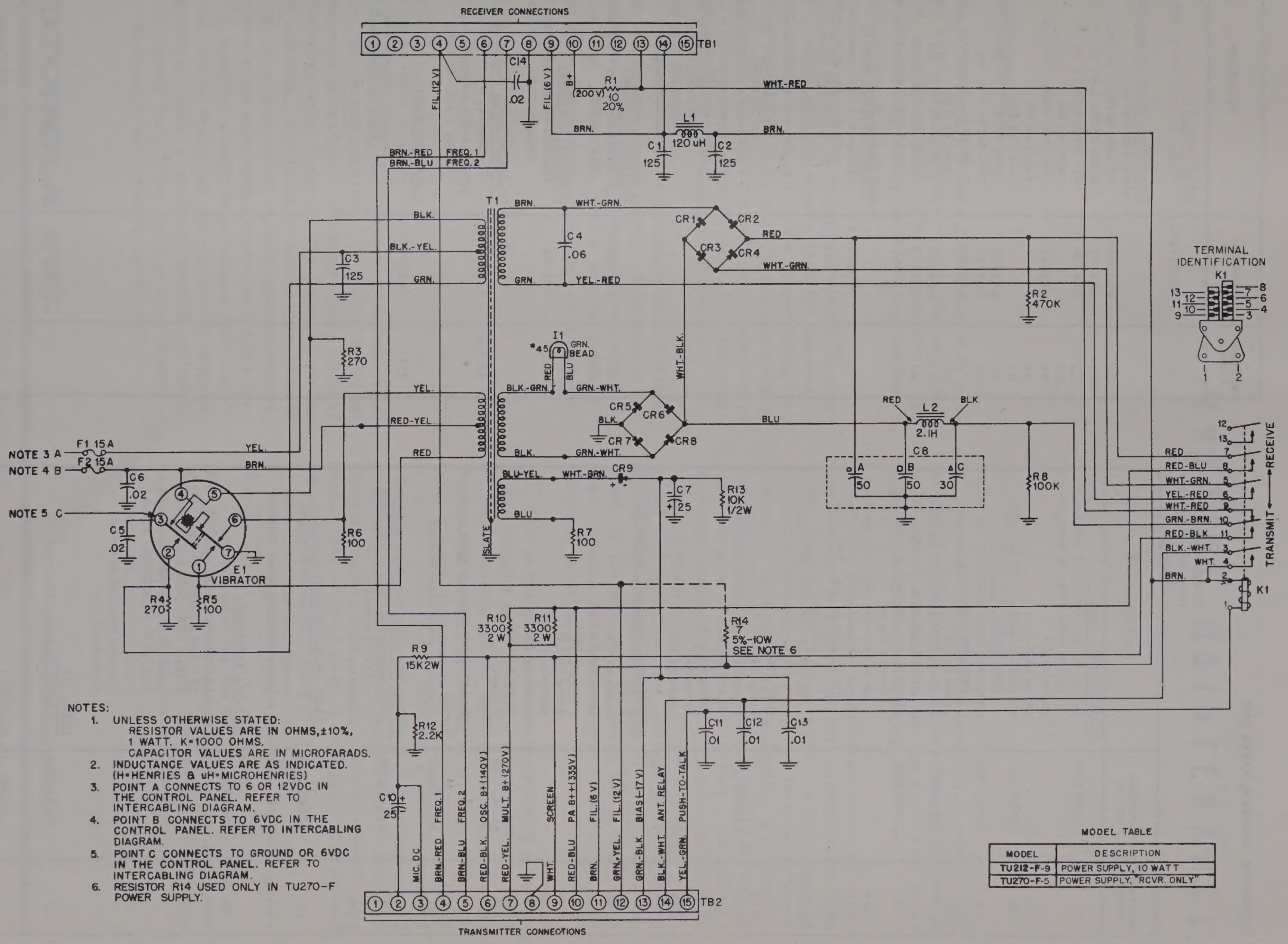
MODEL	DESCRIPTION
TU212-10	POWER SUPPLY, 10 WATT
TU270-6	POWER SUPPLY, "RCVR. ONLY"

TU212 Power Supply
Schematic Diagram
Motorola No. 63D836037-K
1/15/60-CP

PARTS LIST for Schematic Diagram 63D836037-K

TU212 Vibrator Power Supply (10 Watt) Trunk Mount

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed:
C1	23K840707	electrolytic; tubular; 1 section; 125 uf +100-10%; 16 vdcw
C2		same as C1
C3		same as C1
C4	8B800146	oil filled; tubular; .06 uf ±10%; 1600 vdcw
C5	21B401029	ceramic; disc; shielded; .02 uf +80-20%; 600 vdcw
C6		same as C5
C7	23K850516	electrolytic; tubular; 1 section; 25 uf +100-10%; 25 vdcw
C8	23K825606	electrolytic; tubular; 3 section; consisting of:
C8A		⌓ 50 uf +50-10%; 450 vdcw; section
C8B		□ 50 uf +50-10%; 300 vdcw; section
C8C		△ 30 uf +50-10%; 300 vdcw; section
C9		NOT USED
C10		same as C7
C11	21B801139	ceramic; disc; .01 uf +80-20%; 600 vdcw
C12		same as C11
C13		same as C11
C14		same as C5
C15	21B800801	ceramic; disc; 1500 uuf GMV +100% max.; 500 vdcw
		RECTIFIER, metallic:
CR1	48D842140	selenium; 6 plate
CR2		same as CR1
CR3		same as CR1
CR4		same as CR1
CR5		same as CR1
CR6		same as CR1
CR7		same as CR1
CR8		same as CR1
CR9	48A800116	selenium; 1 plate
		VIBRATOR,
E1	48C830082	dual interrupter type; 6 volt; 7 contact male plug-in base
		FUSE, cartridge:
F1	65K838299	one time; glass; 15 ampere; 32 volt; 1-1/4" long x 1/4" dia.
F2		same as F1
		LAMP, incandescent
I1	65K831645	3.2 volt; .35 ma; single contact miniature bayonet base; tubular glass; type 45
		CONNECTOR, receptacle:
J1	28C802820	male; 19 contact; polarized; rectangular molded mica filled plastic base; chassis mounted
		RELAY, armature:
K1	80K831612	6 volt; dual stack; contact arrangement; 1st stack; 1 form "A" and 1 form "C"; 2nd stack; 3 form "A"; does not include 15K848892 COVER relay or 7A811735 BRACKET, relay cover mounting; which must be ordered separately
		COIL, RF:
L1	24A812763	choke; 120 microhenries
		REACTOR:
L2	25B837416	filter: 2.1 henries at 100 ma.dc
		RESISTOR, fixed:
R1	6R118205	carbon; 10 ohm ±20%; 1 w; ins.
R2	6R6459	carbon; 470K ±10%; 1 w; ins.
R3	6R6336	carbon; 270 ohm ±10%; 1 w; ins.
R4		same as R3
R5	6R6415	carbon; 100 ohm ±10%; 1 w; ins.
R6		same as R5
R7		same as R5
R8	6R6328	carbon; 100K ±10%; 1 w; ins.
R9	6R5732	carbon; 15K ±10%; 2 w; ins.
R10	6R2029	carbon; 3.3K ±10%; 2 w; ins.
R11		same as R10
R12	6R6409	carbon; 2.2K ±10%; 1 w; ins.
R13	6R6320	carbon; 10K ±10%; 1/2 w; ins.
		TRANSFORMER,
T1	25C800136	power: vibrator; 6 volt; consists of: primary #1: BLK, GRN and BLK YEL center tapped conductors primary #2: YEL, RED and RED-YEL center tapped conductors secondary #1: BRN and GRN conductors secondary #2: BLK-GRN and BLK conductors secondary #3: BLU-YEL and BLU conductors
		BOARD, terminal:
TB1	31B802699	14 soldering lug terminals
TB2		same as TB1
		SOCKET,
XE1	9A6776	vibrator: female; 7 contact; molded black bakelite base; saddle mounting
		FUSEHOLDER,
XF1, 2	31B857743	dual fuse mounting; rectangular black bakelite base; chassis mounted; for 1-1/4" long x 1/4" diameter fuses
		LAMPHOLDER,
XI1	9A813001	miniature single contact; molded phenolic bayonet base; includes BLUE and RED conductor



NOTES:

1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS,±10%, 1 WATT. K=1000 OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)
3. POINT A CONNECTS TO 6 OR 12VDC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
4. POINT B CONNECTS TO 6VDC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
5. POINT C CONNECTS TO GROUND OR 6VDC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
6. RESISTOR R14 USED ONLY IN TU270-F POWER SUPPLY.

MODEL TABLE

MODEL	DESCRIPTION
TU212-F-9	POWER SUPPLY, 10 WATT
TU270-F-5	POWER SUPPLY, "RCVR. ONLY"

TU212-F Power Supply
Schematic Diagram
Motorola No. 63D836038-J
1/15/60-CP

SCHEMATIC DIAGRAM PARTS LIST

Reference:
Schematic Diagram
63D836038-J

REFERENCE SYMBOL	MOTOROLA PART No.	DESCRIPTION
		CAPACITOR, fixed:
C1	23K840707	electrolytic; tubular; 1 section; 125 uf +100-10%; 16 vdcw
C2		same as C1
C3		same as C1
C4	8B800146	oil filled; tubular; .06 uf ±10%; 1600 vdcw
C5	21B401029	ceramic; disc; shielded; .02 uf +80-20%; 600 vdcw
C6		same as C5
C7	23K483807	electrolytic; tubular; 1 section 25 uf +100-10%; 25 vdcw
C8	23K825606	electrolytic; tubular; 3 section; consisting of:
C8A		⌓ 50 uf +50-10%; 450 vdcw; section
C8B		□ 50 uf +50-10%; 300 vdcw; section
C8C		△ 30 uf +50-10%; 300 vdcw; section
C9		NOT USED
C10		same as C7
C11	21A801139	ceramic; disc; .02 uf +80-20%; 600 vdcw
C12		same as C11
C13		same as C11
C14		same as C5
		RECTIFIER, metallic: selenium;
CR1	48D842140	6 plate
CR2		same as CR1
CR3		same as CR1
CR4		same as CR1
CR5		same as CR1
CR6		same as CR1
CR7		same as CR1
CR8		same as CR1
CR9	48A800116	1 plate
		VIBRATOR: dual interrupter type; 6 volt;
E1	48C830082	7 contact male plug-in base
		FUSE, cartridge: one time; glass;
F1	65K838299	15 ampere; 32 volt; 1-1/4" long x 1/4" diameter
F2		same as F1
		LAMP, incandescent:
I1	65K831645	3.2 volt; .350 ampere; single contact bayonet base; tubular glass; GREEN bead; type 45
		RELAY, armature:
K1	80K831612	6 volt; dual stack; contact arrangement; 1st stack; 1 form "A" and 1 form "C"; 2nd stack, 3 form "A"; does not include 15A811737 COVER, relay or 7A811735 BRACKET, relay cover mounting; cover and bracket must be ordered separately
		COIL, RF:
L1	24A812763	choke; 120 microhenries
		REACTOR; AF:
L2	25B837416	choke; 2.1 henries at 100 ma dc
		RESISTOR, fixed: carbon; unless otherwise stated
R1	6R118205	10 ohm ±20%; 1 w; ins.
R2	6R6459	470K ±10%; 1 w; ins.
R3	6R6336	270 ohm ±10%; 1 w; ins.
R4		same as R3
R5	6R6415	100 ohm ±10%; 1 w; ins.
R6		same as R5
R7		same as R5
R8	6R6328	100K ±10%; 1 w; ins.
R9	6R5732	15K ±10%; 2 w; ins.
R10	6R2029	3.3K ±10%; 2 w; ins.
R11		same as R10
R12	6R6409	2.2K ±10%; 1 w; ins.
R13	6R6320	10K ±10%; 1/2 w; ins.
R14	17K86037	wirewound; 7 ohm ±5%; 10 w; ins.
		TRANSFORMER, power:
T1	25C800136	vibrator; 6 volt; consists of: primary #1: BLK, GRN and BLK-YEL center tapped conductors primary #2: YEL, RED and RED-YEL center tapped conductors secondary #1: BRN and GRN conductors secondary #2: BLK-GRN and BLK conductors secondary #3: BLU-YEL and BLU conductors
		BOARD, terminal:
TB1	31B802699	14 soldering lug terminals
TB2		same as TB1
		SOCKET, vibrator:
XE1	9A6776	female; 7 contact; molded black bakelite base; saddle mounting
		FUSEHOLDER; dual fuse mounting;
XF1, 2	31K835455	rectangular black bakelite base; chassis mounted; for 1-1/4" long x 1/4" diameter fuses
		LAMPHOLDER:
XI1	9A813001	miniature single contact molded phenolic bayonet base; includes BLUE and RED conductor

ROUTINE MAINTENANCE

1. INTRODUCTION

Experience has shown that there is a particular way of maintaining 2-way radio communications equipment that is far superior to any other in achieving maximum operating efficiency and reliability at least cost.

This procedure is known as "System Maintenance", which simply means that the inspection and maintenance of all units constituting the whole is conducted in an established and orderly fashion. The procedure should be conducted at regular intervals in order to yield all of the well-known benefits of preventive maintenance.

All two-way radio communications systems include integrated assemblages. A failure in any one of these would constitute a failure of communications. However, there are three major factors in a mobile radio communications system which require attention:

a. The primary power source

b. The basic radio units

c. The antenna system

Any successful maintenance program must include the entire system. It would be of no consequence to maintain the basic radio units at top efficiency only to ignore the primary power or the antenna. A failure in either one results directly in a failure of radio communications. Therefore, to be successful in preventive maintenance a program should be developed and closely followed on a basis of all-inclusive system maintenance. Such a program should include a periodic check on all the factors constituting a radio communications system as follows:

a. Primary Power

Automobile batteries usually fail after a long period of undercharging or overcharging, lack of water, poor connections or old age, with many indications of the approaching end.

From the radio technician's point of view, the voltage available at the battery terminals under load is the telling point. A fully charged lead-acid battery under a given load may show a measured voltage of approximately 6.4 volts in the case of a "six-volt" battery and 12.8 volts in the case of a "twelve-volt" battery. An old sulphated or undercharged battery may show voltages of only 6 volts or lower. These are battery terminal voltages, not the voltage present at the units. The terminal voltage at the units in the trunk of the car will probably be .5 to .7 volts lower when a transmit current of about 40 to 60 amperes is being drawn.

One of the good methods of checking primary power trouble is to measure battery voltage both at the terminals of the battery and at the equipment. An immediate drop in voltage of more than .2 volts measured at the battery on a short transmit cycle would indicate a battery in poor condition. A drop of more than .7 volts measured at the units would point to troubles in the primary circuit--cable, fuse block, relay or chassis return. This voltage drop is excessive and should be investigated fully.

"A" relay contacts wear out, requiring replacement.

Fuses get tired, sometimes even when new they may have too much resistance. Check and replace if voltage drop exceeds .1 volt.

Connections loosen as a result of vibration. Tighten or resolder.

Fuse Holders also loosen because of vibration. They lose their temper because of heat resulting from poor contact. Acid causes corrosion. Accumulation of oil and dirt increases contact resistance and the remedial action is to clean contacts, tighten or replace.

Keeping voltage drops to a minimum in a primary circuit is very essential to good system operation. The same rules apply to other sources of power. Dry batteries especially must be checked under full load. Some knowledge of the number of hours of use must be available as an indication of when they most likely will need to be replaced.

b. Unit Assemblages

These include transmitter, receiver, power supply, and associated units. Very few adjustments need to be made regularly in transmitter and receiver units. To catch a maximum number of incipient troubles, the technician must use his eyes, his ears, his sense of touch, and meter measurements, as well as his good judgment and past experience.

Basically four types of observation are required:

Listening Tests

An experienced technician can often detect warnings of impending trouble by noting the audio quality, the noise background and the squelch operation in relation to the settings of the volume and squelch controls. He will come to know the normal signal level he should obtain at given locations with selected stations in a particular system. Degradation of performance will be immediately apparent to the technician who checks the set periodically, whereas the steady operator may become accustomed to a gradually degraded performance.

Visual Inspections

Look for loose bolts, screws and clamps, worn handset cords, burned out pilot lights, arcing at any point, loose or broken components, burned resistors, or loose connections. A good visual inspection not only is a means of quickly locating the source of trouble, but may prevent more serious trouble from developing later.

Touch

The fingers are good detectors of improper temperature conditions. Fuses, fuse holders, crystal ovens, transformers and relay coils which are too hot mean trouble. Also, a cold crystal oven, tube or resistor that should normally be warm is probably in trouble. Such tests are quick and should be used often.

Meter Measurements

Actual quantitative measurements of "A" and "B" voltages, grid and plate currents, power output, frequency and deviation have no substitute; their meaning is definite. Experience will indicate to what degree variation can be tolerated. Good test equipment is essential to good system performance.

c. Antennas

Visual check of antenna, antenna mount, cable, and connectors should be made periodically, as well as a meter check to find any open or shorted lines. Remember that the antenna must efficiently radiate the power developed in the transmitter chassis and also transfer to the receiver the minute voltages picked up from the distant transmitter to produce a good audible signal. Failure of the antenna or line is a failure of the communications system.

d. Netting

Netting of receivers and transmitters in any system is more important than usually realized. The term "netting" means that all receivers and transmitters in a given system are aligned on the same frequency or frequencies. With modern selectivity requirements, it is more than ever necessary to tune every receiver exactly to the station it must receive. Careful "netting" of all units in an integrated system to the correct frequency is a first order requirement of a modern communications system and will eliminate a prime cause of poor system performance. It is in this field of system operation that the high frequency stability and selectivity stability is of major importance.

Frequent checks of transmitter deviation will improve system operation. A good rule to follow is to check performance frequently and make adjustments only when actual tests and measurements show improper operation.

2. MAINTENANCE CHECKS

A good preventive maintenance program requires a complete system check at least every three months and it is recommended that individual records be kept of each unit. In a general way the following items should be part of any preventive maintenance routine.

a. Clean and dust the equipment thoroughly.

b. Make a thorough mechanical inspection of the entire mobile installation.

c. Check the battery terminals. Battery connections must be clean and tight at all times to prevent power losses due to excessive voltage drops across loose connections.

d. Check the fuses. Fuses must fit snugly in the fuse holders to prevent voltage drops at these points.

e. The vehicle battery should be checked at least once a month, however, it is recommended to make this check weekly to assure that it is properly charged. A specific gravity measurement is recommended for this purpose. The reading obtained should be in agreement with the normal operating specifications stipulated by the battery manufacturer.

f. Check the A-plus voltage at the battery and at the radio set with the radio equipment turned "on" and the vehicle motor turned "off".

g. Check the DC resistance from the inner conductor to the outer conductor of the antenna coaxial lead-in cable.

h. Power Input Cables

Power cable connections may be checked by measuring the overall voltage drop from the battery to the equipment. With the transmitter "on" and the vehicle motor running, the voltage drop from the ground cable of the radio equipment to the battery ground terminal should be negligible. The voltage drop in the power cable from the (hot) battery terminal to the equipment should not exceed 0.6 volts (6 volt models) or 1.2 volts (12 volt models). Cable voltage drop will be the difference between the voltage reading obtained from the battery terminal to ground and the reading obtained from a voltage input point on the mobile equipment to ground. These voltage measurements should be made with an accurate DC voltmeter. Proper operation of this equipment depends upon correct input voltage. The input voltage may be measured at fuse F2 on the fuse board located on the top front end of the power supply chassis (terminal with yellow lead attached). The drawer assembly must be partially pulled out of the mobile housing to permit access to convenient voltage input measuring point.

i Vehicle Generator and Voltage Regulator

Routine Maintenance Checks should be made on the vehicle generator and voltage regulator to insure proper operation of the radio equipment. Periodic maintenance should include:

(1) Checks of generator brush condition and replacement if necessary.

(2) Checks of generator armature condition.

(3) Check of generator output and voltage regulator setting. This setting should conform to either the car manufacturer's or the generator manufacturer's recommendations.

(4) Check of generator lubrication and relubrication if required.

j. Antenna

Routine preventive maintenance of mobile systems should include a continuity check of the braided lead between the antenna rod and the coaxial lead-in. Ordinarily hidden from view within the base assembly, the lead may become frayed or broken without attracting immediate notice. However, any decrease in RF continuity introduced here will cause a decrease in radiated power and receiver sensitivity. Moreover, intermittent contact can generate undesirable interference in the form of noise caused by:

(1) high contact resistance.

(2) imperfect bonding which permits the inherent noise to enter the receiver.

k. Clean the relay contacts.

l. Test all vacuum tubes of the radio equipment and replace if necessary.

m. Check the filament voltage (6/12 VDC) and the B+ voltages.

n. Set the transmitter oscillators on frequency.

o. Tune the entire transmitter.

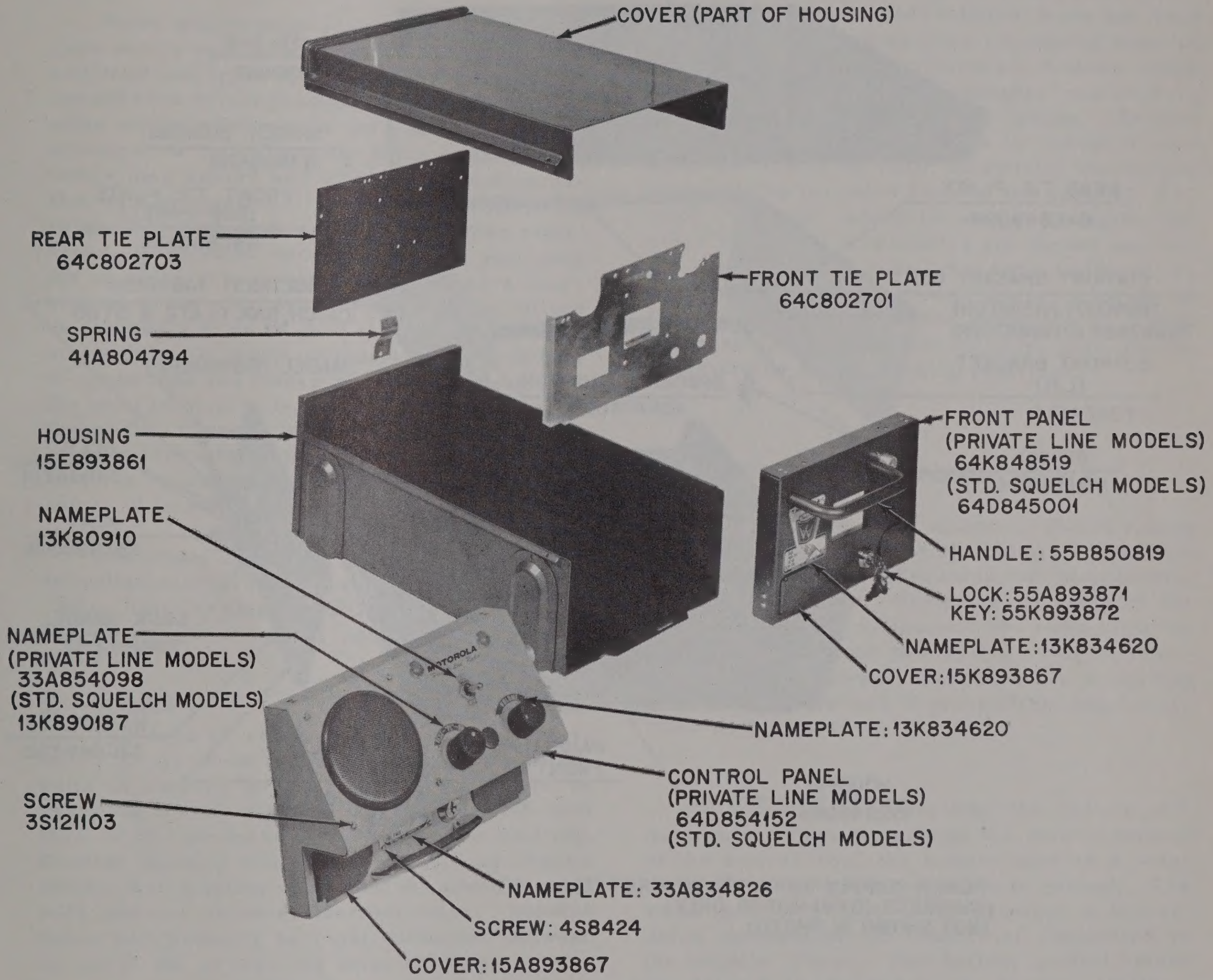
p. Check the modulation on the frequency monitor.

q. Tune the entire receiver.

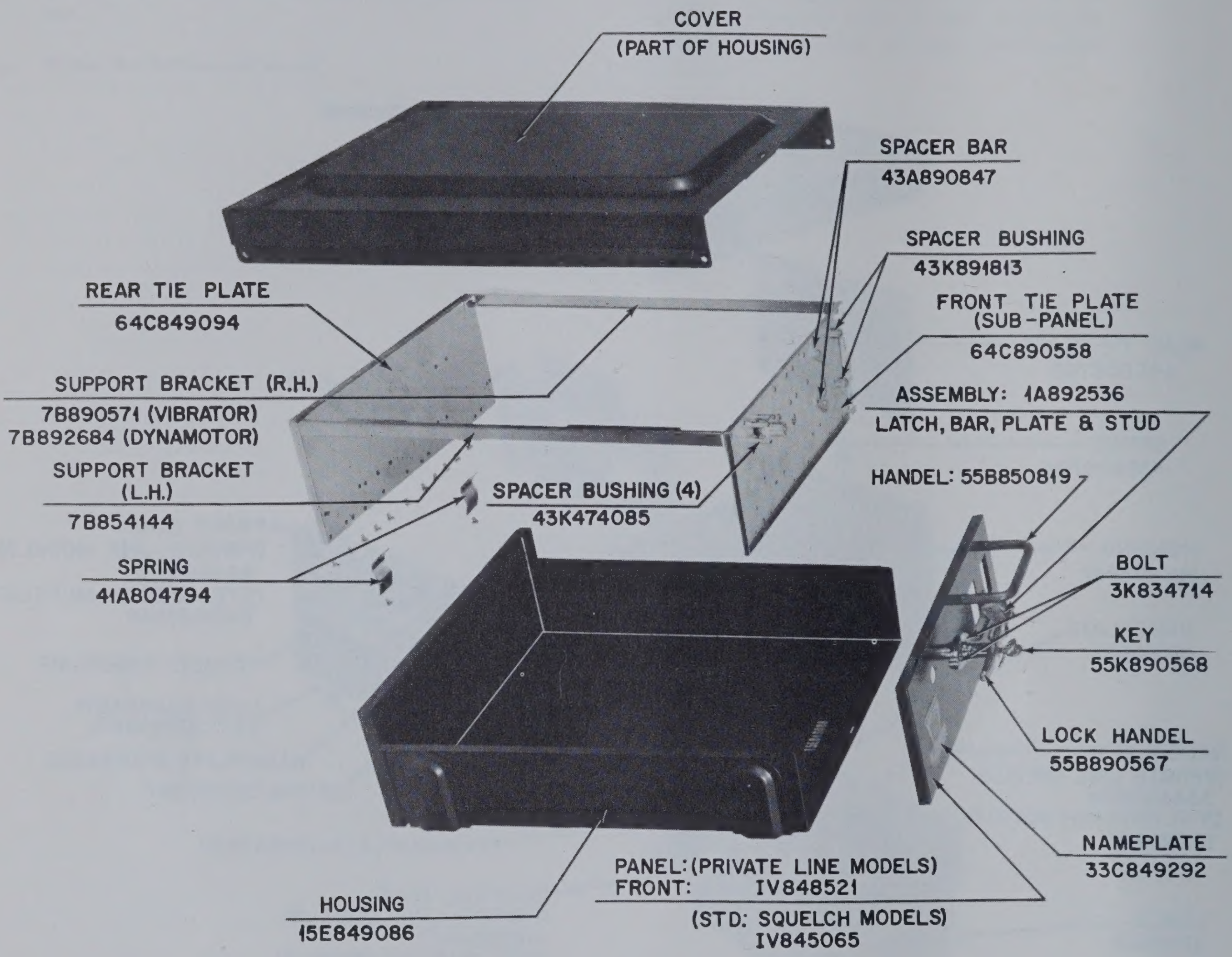
r. Check the audio response against a fixed station.

NOTE

For detailed alignment procedures of the various chassis refer to the pertaining instruction section of this instruction manual.



10" Mobile Housing
Parts Identification Detail
Motorola No. EPD-901-A
1/15/60-CP



POWER SUPPLY SUPPORT BRACKET (2)
7A890573 (DYNAMOTOR ONLY)
(NOT SHOWN IN PHOTO)

EPD-902-A (CE1334-B)

15" Mobile Housing
Parts Identification Detail
Motorola No. EPD-902-A
1/15/60-CP

SUPPRESSION OF IGNITION NOISE IN MOBILE EQUIPMENT

1. NOISE SUPPRESSION

Noise suppression requirements will vary quite widely with different vehicles, types of installation and types of system operation. System use and area coverage often determine how much noise suppression may be necessary. If the operating area is sufficiently small so that signal levels may always be high, less noise suppression will be required. Conversely for maximum range coverage and operation in weak signal areas, it becomes necessary to do a very good job of noise suppression. If the units are operating in areas with high ambient noise, it will not be necessary to do as good a job of vehicle noise suppression. It would obviously be uneconomical to spend time and money on noise suppression if the local ambient noise in the area is going to be higher than the vehicle interference levels. One of the first considerations is to determine that the noise is caused by the vehicle in which the receiver is located.

The Model TEN6018A Noise Suppression Kit is available for all vehicles equipped with two-way radio. Refer to diagram 69C854657 at the end of this section for a typical noise suppression installation.

2. SOURCE

The type of noise can generally be determined by its sound in the speaker. For best results in locating noise, the receiver should be receiving a weak signal which produces not less than 10 db. nor more than 30 db. noise quieting. Greater quieting will mask the noise by limiter action; less quieting will mask the specific noise with inherent receiver thermal noise. Impulse noise will probably be most noticeable between 20 and 30 db. of receiver noise quieting.

Ignition noise is characterized by regular "popping or snapping" heard at the speaker and will vary with the speed of the engine. This noise may be generated in the ignition coil, distributor, or the spark plugs and radiated from any lead connecting these components. A whining noise is probably generator interference. A harsh rasping noise is generated by gauges, particularly the pulsing type temperature gauge. Erratic "popping" while the vehicle is in motion is possibly the result of static electricity discharges from moving insulated parts of the vehicle. Erratic "popping" which increases as lights and other electrical accessories are turned on, can be the result of miniature arcs produced by minute potential differences between portions of the vehicle body, frame and motor block. These potential differences, for the most part, can be corrected by proper bonding practices.

3. RADIO EQUIPMENT POWER SOURCE

Power for the radio equipment should always be obtained directly from the battery rather than some other junction. Feedback and intercoupling can result between interfering currents of the vehicle electrical system and the radio circuits. In some cases these two systems can be intercoupled. It is always best to couple equipment directly to the battery to prevent this coupling as much as possible.

In addition, by connecting the radio's primary power lead directly to the battery instead of the starter key, the battery acts as a large capacitor and by-passes noise to ground. The radio ground return cable requires a secure, clean mechanical and electrical connection to the vehicle frame. The battery ground return should also be bonded to the frame. Utilizing the car frame as a common ground as much as practical, tends to minimize the possibility of inducing many unwanted parallel ground currents.

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Engineering Publications 4501 W. Augusta Blvd. Chicago 51, Illinois

4. IGNITION

The vehicular ignition system is the worst offender from the standpoint of noise generation. The impulse noise produced must be kept under control by proper preventive maintenance and addition of suitable noise suppression items. It is necessary to check for: (1) distributor breaker points in good condition, (2) ignition condenser in good condition, (3) all ignition system connections free of corrosion and making good contact, (4) circuit continuity in the high voltage leads, (5) sufficiently high spark plug breakdown voltages, and (6) spark plug electrodes properly spaced and in good condition. Mobile installation kits usually require at least a noise suppressor resistor to be placed in the lead from the ignition coil to distributor and a shielded by-pass capacitor, to be connected from the ignition coil primary to ground.

5. RESISTANCE TYPE SUPPRESSORS

Additional elements in the ignition circuit are commonly used to attenuate the impulses. Resistor type spark plugs or spark plug suppressors, have been found to be of great assistance in many cases. While the manufacturer claims superior engine performance is obtained by using these plugs, it is recommended that a check be made to assure (1) that the proper plugs are being used, and (2) that the engine performance is at least equal to that obtained using standard plugs. The distributor noise suppressor can be eliminated if a distributor with a built-in resistor is substituted for the standard distributor. Resistance ignition cable can be substituted for standard ignition cable to obtain additional attenuation. In some cars, it has been found that excessive resistance in the spark plug circuit may produce rough idling, particularly in cold weather. Thus, it may not be possible to use a distributor noise suppressor, resistance ignition cable and resistor spark plugs simultaneously in all cars. Today some manufacturers are tending to pre-equip new models with either resistance ignition cable or resistor spark plugs, or both. In such cases, substitution need not be made. Later models have much higher ignition voltage and can, therefore, accommodate the higher total resistance.

6. SPARK PLUG LEADS

In stubborn ignition interference problems, be sure to check the continuity of the spark plug leads. Through use of an ohmmeter or some other continuity indicator, such as dry battery and small bulb, you may find one or more leads open. The first place to check is the spark plug end of the lead. In an ignition system where the end of the lead and the terminal is molded in rubber, the terminal is probably not soldered to the conductor. The connection may be strictly mechanical.

By squeezing the terminal with a pair of pliers, it may register continuity. In this case, the lead is probably satisfactory. With an intermittent indication, it may be necessary to either replace the lead or to open the terminal and solder the lead to the terminal. If the lead is replaced, be sure to check the replacement lead for continuity. If the soldered lead is in the open, be sure to provide suitable protection against weather induced terminal corrosion.

7. CONTACTS

It is always desirable to minimize the number of contacts required in an ignition system, to minimize interference as a result of poor connections. Thus, resistor spark plugs are preferred to standard spark plugs plus spark plug suppressors. Also resistance ignition cable is preferred to standard ignition cable plus series suppressors.

8. COUPLING

Ignition noise can be (1) coupled capacitively from high voltage to low voltage leads, (2) can be radiated from high voltage leads, (3) can be radiated from low voltage leads, (4) can be radiated from other metallic linkages due to shock excitation, (5) can be radiated from ignition leads, and (6) may be radiated from the distributor or ignition coil. Many trial-and-error methods of countering such problems are available, but may consume considerable time and expense in the process. Among the trial-and-error methods are those listed below.

If the lead between the ignition coil and the distributor, or any other ignition lead is a critical length for radiating on the receiver frequency, noise can be reduced by changing its length. Capacitive coupling from high voltage to low voltage leads can be minimized by achieving maximum separation between such leads. For extreme cases it can be minimized by shielding the leads or running the leads in a separate conduit. Complete shielding of the ignition coil and distributor has afforded some relief in a few stubborn cases.

9. DISTRIBUTOR

Ignition noise caused by distributor point sparking and/or radiation taking place and transmitted via associated primary wiring can be reduced by the following:

a. Install a coaxial .1 mfd capacitor at the battery input of the primary side of the ignition coil.

b. Great care should always be taken to be sure that all the wires are pushed completely down into the distributor head towers. Or, solder connections in the distributor cap towers to prevent arcs taking place in the secondary circuit.

c. Install a 10,000 ohm suppressor in the distributor center tower, if a suppressor lead is not used.

10. DC GENERATING SYSTEM

The DC generating system in a car creates a raspy sounding interference and one that is easily recognized by ear. The commutator noise and hash can be eliminated entirely by replacing the DC system with an AC generating system. If this is not contemplated, the following methods may be applied.

11. GENERATOR

Generator noise is characterized by a high pitched "whine" and varies with engine speed. With car in motion check with weak signal, ignition turned off, alternately engaging and disengaging the clutch to drive generator at various speeds.

Noise elimination in the generator system may be as follows:

a. Generator noise may be the result of dirty or worn commutators. Various manuals have instructions for balancing and dressing down dirty commutators. In some cases, commutators may be cleaned with fine sandpaper or dressing stone. Emery cloth should never be used for cleaning commutators. Generator noise can normally be kept at a low level if the brushes and commutator are kept in good condition.

b. Install a 0.5 mfd coaxial capacitor at the generator in series with the armature lead. Keep in mind that the portion of the lead between the condenser and the generator should be kept as short as possible. Any shielding that can be afforded to the armature terminal will be helpful.

c. Install a 0.5 mfd coaxial capacitor at the generator regulator (ARM) terminal in series with the armature lead to the generator.

d. Install a 0.5 mfd coaxial capacitor at the generator regulator (BAT) terminal in series with the battery lead. Keeping the leads on the regulator side as short as possible will benefit here also.

CAUTION

Do not connect a bypass capacitor directly from generator field terminal to ground. (See "Voltage Regulator").

e. In some cases it may be necessary to install shielded wiring between the generator and regulator to stop radiation from the primary winding. In such cases, it is necessary that the braid in shielding over the control wires be extremely well grounded at both ends and very near the connected items. It is necessary to run the shields up very close to the actual connection terminals in order to prevent "hot" areas from radiating interference.

f. Inductance and capacity "Pi" section filters may be sometimes required. Extremely low resistance RF filter coils, about one inch in diameter with 10 to 20 turns of #10 or #12 enameled wire, with each side bypassed to ground, through a .1 or .01 mfd. mica or good paper capacitor, physically mounted and protected will generally remove the last traces of generator noise. The Motorola P-346 generator filter can be utilized to this end.

g. Care should be used that all generator covers are free of paint and grease that might prevent good electrical connection with the generator frames.

NOTE

In all cases where coaxial capacitors are mentioned, they should not be replaced by standard by-passes. The standard by-pass displays a resonance effect with high attenuation, at about 2 megacycles. The coaxial type is noninductive and has high attenutation, up into the U.H.F. region.

12. VOLTAGE REGULATOR

Voltage regulator noise is characterized by a "raspy" sound. Look for arcing of voltage regulator contacts. This noise may be reduced by installing a 3.3 ohm resistor in series with a .002 mfd capacitor (Maximum capacity allowable) in series with the field (F) terminal of the voltage regulator to a common ground with the generator. Resistor must be non-inductive carbon. However, three 10 ohm or 12 ohm resistors in parallel may be substituted. This voltage regulator suppression is often very important, since this noise may be as severe as the generator noise itself.

CAUTION

> Never use a capacitor across the field contacts or between field and ground unless you also use the resistor, for such application will result in greatly reduced regulator life.

13. GAUGES

Gauge noise is characterized by a "hissing" or "crackling" sound which may be detected by jarring the individual gauges while the ignition switch is on. The effect of each individual gauge will be made more pronounced by disconnecting the "hot" lead of all gauges, except the one being checked. One of the most frequent offenders, the temperature gauge, can be corrected by bypassing the temperature gauge lead at the motor block with a .25-.5 mfd by-pass capacitor. However, several later models do not have the pulsing type gauge-senders. Many are merely "on" - "off" contacts associated with a red warning light for the abnormal condition.

14. OIL SENDER

Oil sender noise is characterized by a low-pitch clicking sound. The noise rate varies with the oil pressure and stabilizes at the point of maximum pressure. This interference can be eliminated by installing a .25-.5 mfd by-pass capacitor from the oil gauge lead terminal, on the oil sender, to ground.

15. STATIC CHARGES

Any moving part of the vehicle, insulated from the rest of the vehicle, can build up a static electricity potential, which discharges to produce noise. The front wheels, insulated from the axles by a film of grease, are the primary offenders on this score. Standard grounding brushes or springs, such as front wheel static eliminators, will be satisfactory in most cases where this interference is present.

16. BONDING

In most modern cars and trucks, the vehicle body and frame form the ground return for the electrical circuits. Differences in conductivity, inadequate bonds between adjacent conductors and unequal current distributions result in potential differences throughout the vehicle. The miniature arcs created by these potential differences can be eliminated by eliminating the potential differences themselves. Effective use of copper bonding braid or brass contact wipers will minimize this interference.

Bonding the hood, the exhaust pipe and the muffler, as well as the motor block to the frame will probably provide the greatest improvement. The hood can utilize contact wipers along the edges plus copper braid at the hinge. The copper braid may be placed along the edge of the body so that the hood will mesh into it as it closes. The end of the braid should be connected to the hood with sufficient slack to prevent breakage at the hinge. The exhaust pipe and muffler are often suspended from the frame with a rubber mounting, therefore good contact can be obtained only by additional bonding. Although the engine is already grounded to the frame, with copper braid, additional bonding may be required.

17. COUNTERPHASING OR NOISE BALANCING

It is a characteristic of a FM receiver that, at one point in the alignment, a null point in impulse noise response will be reached. This null may vary from installation to installation. As it leaves the factory, the receiver is tuned to the exact operating frequency and is properly adjusted for proper noise balance. However, if it is found necessary to noise balance the receiver at some future date or in some specific installation, the correct procedure should be used, as follows:

Adjustments should be made with the receiver installed in the mobile vehicle and the vehicle engine running.

a. Turn the equipment "on" and allow it to warm-up for at least five minutes.

b. Radiate a signal on the frequency of the receiver. The signal can originate from a MOTOROLA portable test set with a built-in crystal-controlled peaking generator and correct transmitter crystal, from a signal generator or from a distant transmitter.

The receiver should be on frequency. The received signal should be just strong enough to produce 10 to 30 db quieting.

c. Turn up the receiver volume to a normal listening level.

d. Start the vehicle and let the engine idle. Connect the portable test set to the receiver metering receptacle. Put the test set in position 2. If a portable test set is not available, a microampere meter with a full scale of 50 ua may be used.

e. If adjustment of the second mixer coil does not prove effective, adjust any one of the first i-f coils until ignition noise is substantially reduced.

The first i-f coils are very sensitive and may only be adjusted a very slight amount without reducing receiver gain. When making ignition noise balance adjustments, do not decrease the meter reading more than one-half microampere.

f. If satisfactory reduction of audible noise cannot be obtained by the methods previously described, the secondary winding of the discriminator is probably not aligned to exactly 455 kc. Align the discriminator as described in the receiver alignment procedures.

Noise balancing a receiver may result in an appreciable amount of noise reduction, however, this method alone may not reduce all of the apparent ignition noise. Some vehicles with a minimum of ignition noise interference may require only noise balancing the receiver. Whereas other vehicles will require ignition noise suppression in addition to noise balancing.

18. SUMMARY

Even when no specific noise problem exists, countermeasures should be employed to maximize range and intelligibility. These countermeasures should limit the noise at its source. When noise problems do exist, follow the corrective measures suggested in the instruction manual, and include the following:

1. Check for spark plug breakdown under a compression test.
2. Use resistor spark plugs, spark plug suppressors or resistance ignition cable.
3. Check condition of generator brushes, commutator, armature coaxial and by-pass capacitors. The generator covers should be free of paint and grease that might prevent good electrical connections with the generator frame.
4. Install 3.3 ohm resistor in series with a .002 mfd capacitor from the field terminal (F) of the voltage regulator to a common ground with the generator.
5. Check for the proper bonding, tail pipe grounded to frame with copper braid, motor block grounded to the frame, etc.
6. By-pass oil sender, gauges.
7. Check for open circuits in the high voltage leads between the spark plug and distributor.
8. Check and adjust the distributor points and check the ignition capacitor.
9. See that power for the radio equipment is obtained directly from the battery.
10. Noise balance the vehicle radio receiver.

Specific noise sources may be isolated to some extent, under specific conditions. When the vehicle is standing still with the ignition switch off, any noise heard will probably be external to the vehicle. Static discharge noise will be added when the vehicle is moving with the ignition switch off. If the vehicle is coasting in gear, with the ignition switch off, generator noise will be added to the others, if present. Noise produced by inadequate bonding will be most noticeable when maximum current is being drawn from the battery, and may be increased when the vehicle is in motion. Care should be used to be sure that noise tests are made both with and without weak signals. Also, care should be used to check with squelch control in the unsquelched or maximum sensitivity condition.

Radiating a signal from the signal generator to the vehicle antenna system is most useful in establishing a reference level to determine when any improvement in noise reduction is made.

The use of a coaxial flexible lead, with a probe pick up loop about one inch diameter, connected to a separate powered radio set or oscilloscope and utilized as a search wand to find the hottest areas, has been found to be most useful.

It is impossible to give an exact procedure to counteract noise in all cases; too many variables exist. With an understanding of some of the sources of noise, an intelligent approach will often save considerable time. Ignition noise suppression can add to both operational efficiency and operator satisfaction.

Other suggestions for noise suppression aids are as follows:

DESCRIPTION	PART NO.
Hood Wiper Kit	1V81618
Incl.: 4 Hood Wipers	39A4205
4 Tapping Screws (8 x 3/8)	3S7516
Wheel Static Collector Assembly	1K534254
Incl.: 2 Wheel Static Collectors	1K534255
2 Wheel Static Collector Springs . .	41B534253
2 Wheel Static Collector Contacts . .	39A534252

NOISE IDENTIFICATION AND SUPPRESSION CHART

Characteristics of Noise at Speaker	Source of Noise	How to Check Source of Noise	How to Suppress Noise
Identified as popping sound	Ignition	Noise varies in frequency with engine speed and will disappear when ignition is switched off.	1. Check to be sure: (1) Distributor breaker points are in good condition. (2) Ignition condenser is in good condition. (3) All ignition system connections are free of corrosion & making good contact. (4) THERE IS DC CONTINUITY IN HIGH VOLTAGE LEADS. (5) There are sufficient high spark plug breakdown voltages. (6) Spark plug electrodes are properly spaced and in good condition. 2. Bond each corner of the motor block to chassis ground using a heavy copper grounding braid.

NOISE IDENTIFICATION AND SUPPRESSION CHART (Cont'd)

Characteristics of Noise at Speaker	Source of Noise	How to Check Source of Noise	How to Suppress Noise
			3. Damp the high voltage by installing a resistor suppressor in the distributor rotor lead, or suppressors in the ignition cables or on top of the spark plugs. 4. Install resistor spark plugs or ignition cables.
Identified as a high pitched whine	Generator	Noise varies with engine speed and will persist if ignition is switched off while engine is running at a moderate speed.	1. Install a .25 - .5 mfd. coaxial capacitor at the generator in series with the armature lead 2. A hand wound choke in series with the generator field has been used with considerable success. 3. Install a MOTOROLA Model P-346 Generator Filter in series with the armature.
Identified as a raspy sound	Voltage Regulator	Look for arcing of voltage regulator contacts.	Install .25 - .5 mfd. coaxial capacitors at the battery (BAT) terminal in series with the battery lead and at the generator (ARM) terminal in series with the armature lead.
Identified as a hissing or crackling sound	Gauges	Noise may be detected by jarring the individual gauges while the ignition is on.	Install .25 - .5 mfd. by-pass capacitors where needed.
Identified as a low-pitch clicking sound	Oil Sender	Noise rate varies with oil pressure and stabilizes at point of maximum oil pressure.	Install .25 - .5 mfd. by-pass capacitor from gauge lead terminal on Oil Sender to chassis ground.
Identified as an irregular popping sound	Wheel Static	Noise disappears when brakes are lightly applied.	Install suitable grounding brushes or springs such as front wheel static eliminators.
Identified as a more regular or sharper popping sound	Tire Static	Noise becomes much worse at 30-50 m.p.h.	Use anti-static powder in tire tubes.

NOTES:

1. THE 0.1 UF COAXIAL CAPACITOR SHOULD BE MOUNTED AS CLOSE TO THE IGNITION COIL PRIMARY INPUT AS POSSIBLE.
2. EITHER A SUPPRESSOR CABLE OR A RESISTOR SUPPRESSOR IN THE DISTRIBUTOR ROTOR LEAD OR BOTH MAY BE USED ACCORDING TO THE REQUIREMENTS OR THE LIMITATIONS OF THE INDIVIDUAL INSTALLATION. SEE PARAGRAPH 5 OF THIS SECTION FOR FURTHER DETAILS.
3. EITHER RESISTOR SUPPRESSORS IN THE DISTRIBUTOR SPARK PLUG LEADS, OR RESISTANCE WIRES, OR RESISTANCE SPARK PLUGS OR ANY COMBINATION MAY BE USED ACCORDING TO THE REQUIREMENTS OR THE LIMITATIONS OF THE INDIVIDUAL INSTALLATION. SEE PARAGRAPH 5 OF THIS SECTION FOR FURTHER DETAILS.
4. THE 0.5 UF COAXIAL CAPACITORS SHOULD BE MOUNTED AS CLOSE TO THE GENERATOR AND THE REGULATOR AS POSSIBLE.
5. NOISE SUPPRESSION CAN BE ACHIEVED ONLY IF COMPONENTS ARE PROPERLY GROUNDED. BE SURE ALL COMPONENTS ARE PROPERLY GROUNDED.

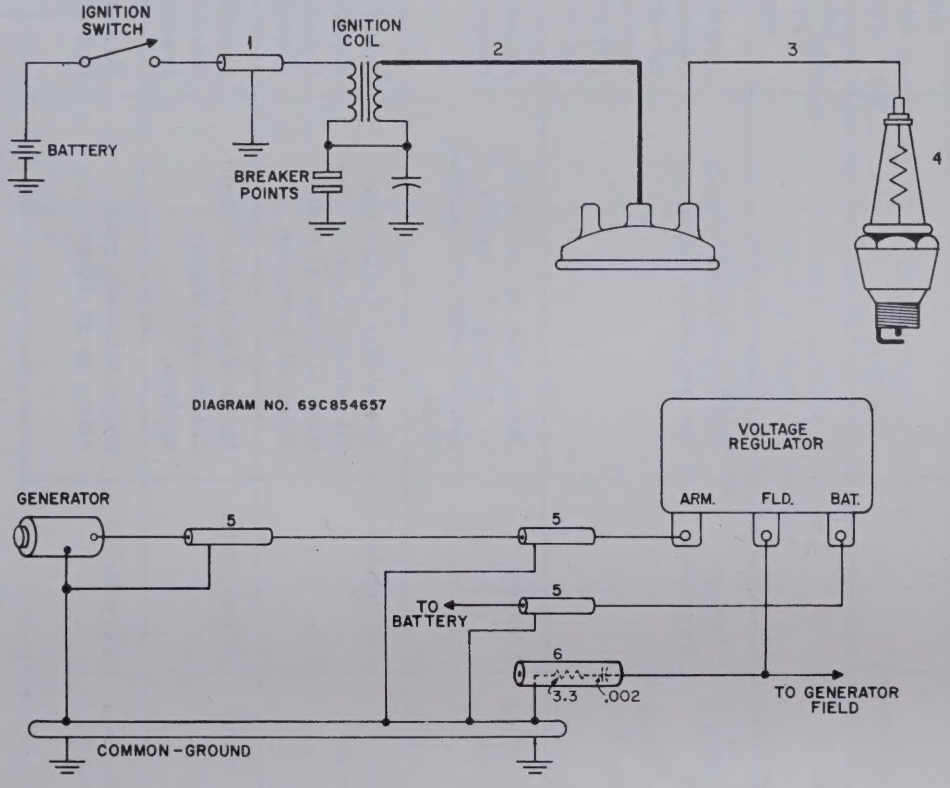

DIAGRAM NO. 69C854657

TYPICAL NOISE SUPPRESSION DETAIL

THIS DIAGRAM IS A SUGGESTED NOISE SUPPRESSION SETUP. IT MAY BE USED IN ITS ENTIRETY OR IN PART, ACCORDING TO THE NEEDS OR LIMITATIONS OF THE INDIVIDUAL INSTALLATION. (SEE TEXT FOR COMPLETE INFORMATION.)

REF. SYM.	DESCRIPTION	PART NO.
1	*COAXIAL CAPACITOR, 0.1 UF	8B839908
2	*SUPPRESSOR CABLE	30A502396
3	RESISTIVE WIRE	SEE AUTO PARTS DEALER
4	RESISTOR SPARK PLUG	AUTO-LIGHT OR CHAMPION
5	*COAXIAL CAPACITOR, 0.5 UF	8K839909
6	*GENERATOR FIELD SUPPRESSOR ASSEMBLY (3.3Ω RESISTOR & .002 UF CAPACITOR)	1V80700A89

* THE TEN6018A NOISE SUPPRESSION KIT CONSISTS OF THE ITEMS MARKED WITH AN ASTERISK.

Typical Noise Suppression Detail
Motorola No. 69C854657-A
1/15/60-CP